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meccano magazine

June

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1965

IN THIS ISSUE

- Plans for a model helicopter
- Story of the T.T. Races

Fuelling-up for a flip to France

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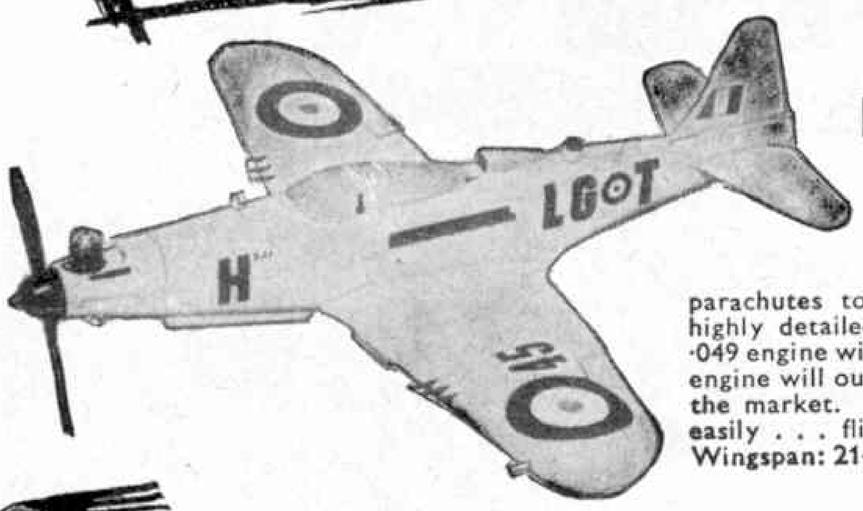
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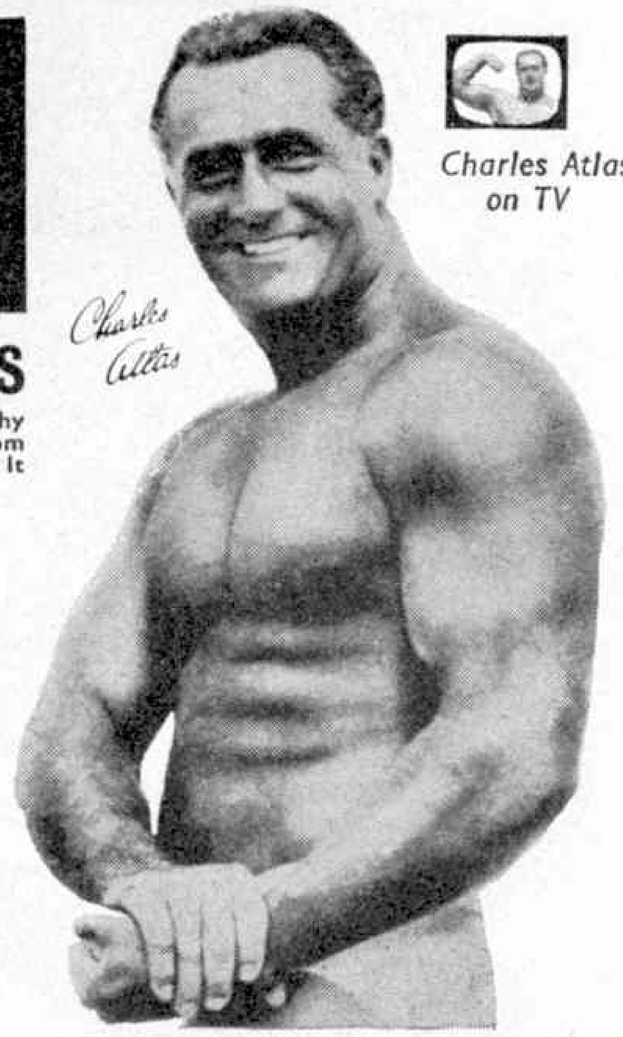
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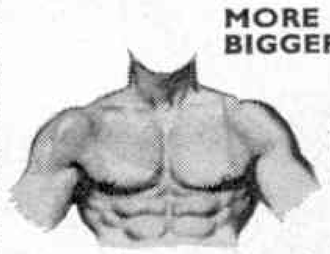
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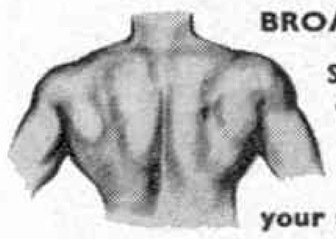
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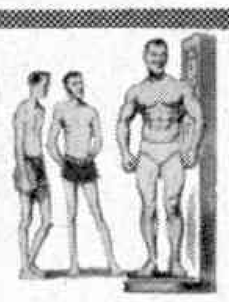
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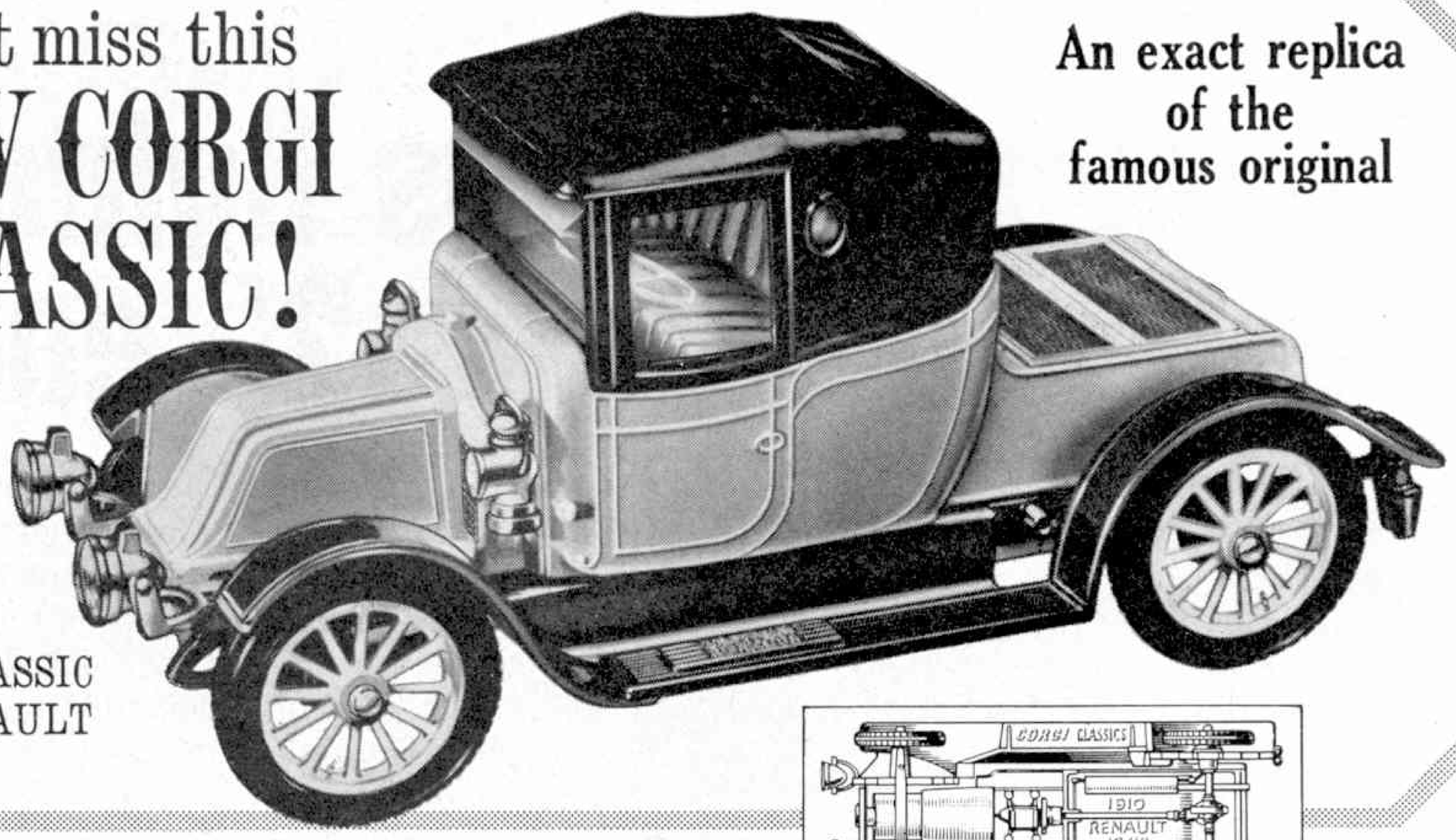
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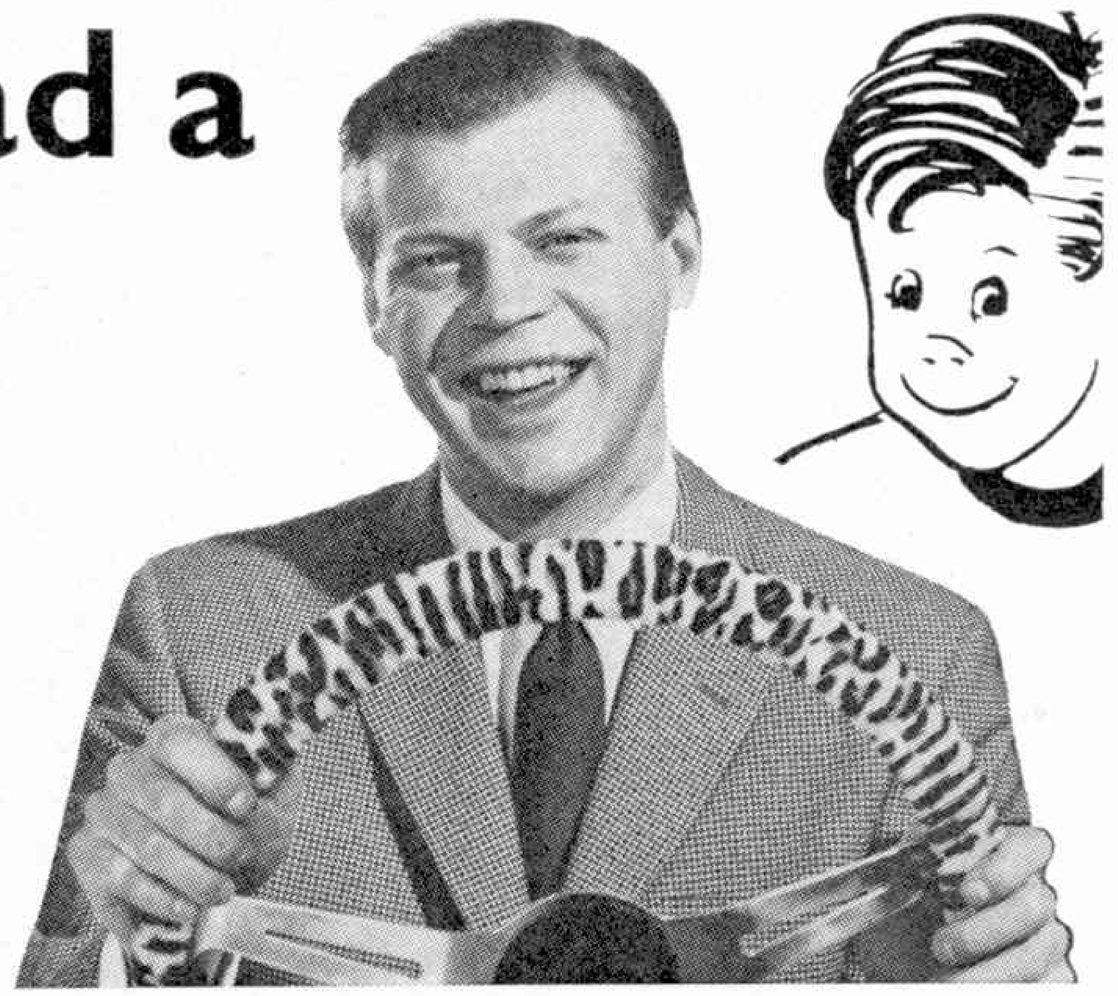
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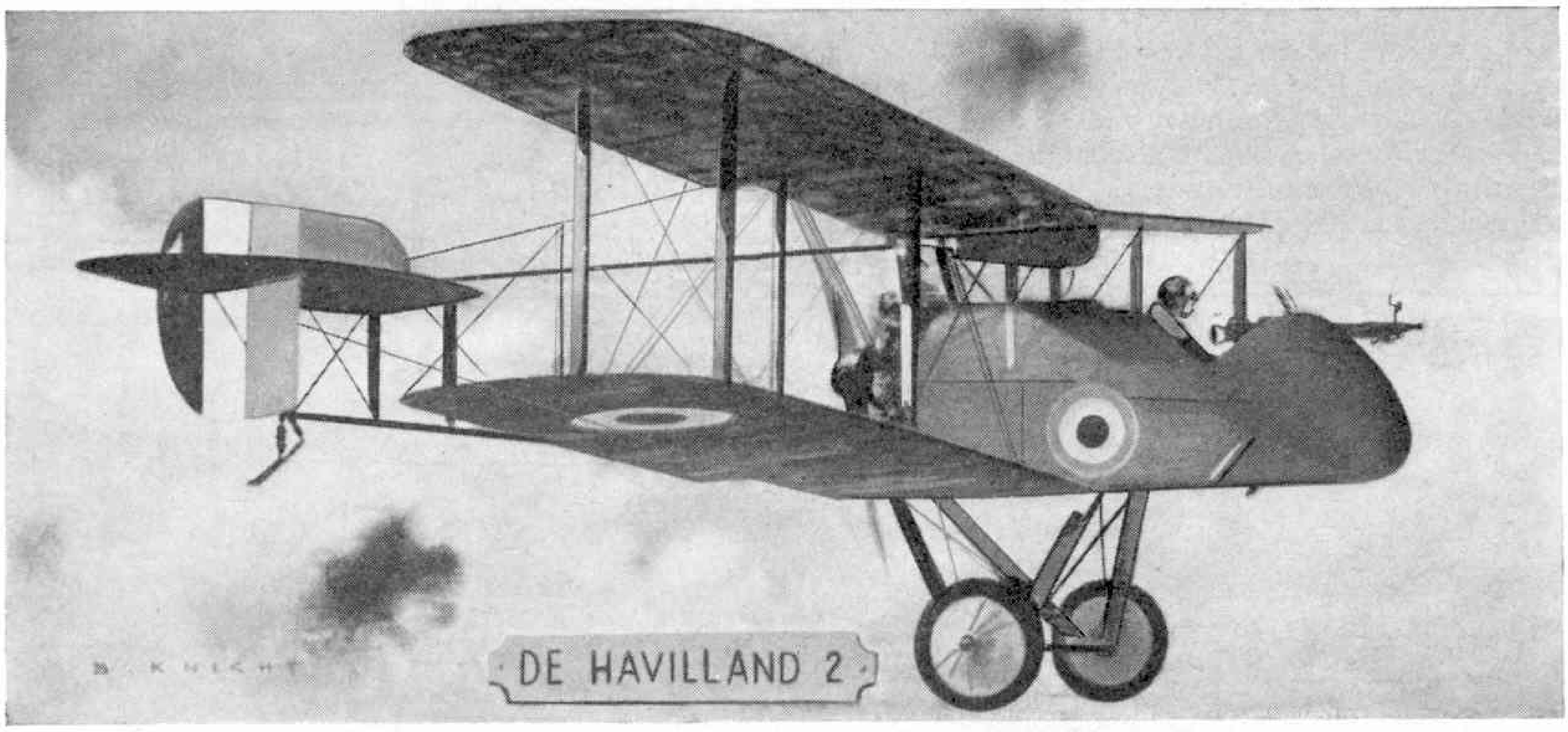


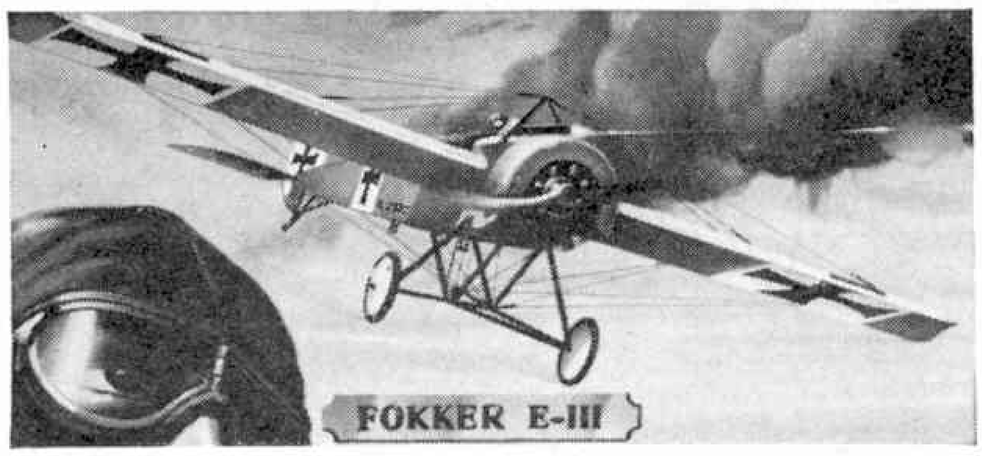
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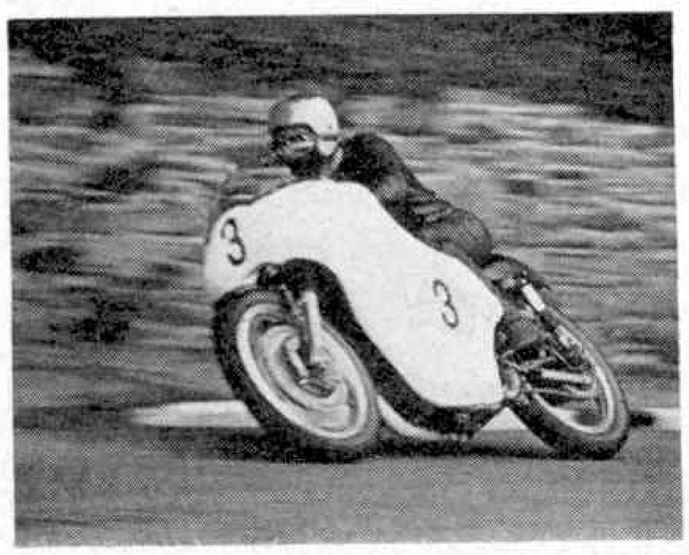
Editor Charles E. Deane; **Design** R. S. Sodhi; **Advertisement Manager** Tony Johnson; **Head Office** Thomas Skinner & Co. (Publishers) Ltd., St. Alphage House, Fore Street, London, E.C.2. Phone: NATional 4050. Grams: Desollar, London, E.C.2; **New York** 111 Broadway, New York City, U.S.A.; **Ottawa** Suite 35, 75 Sparks Street, Ottawa, Ontario. *© Meccano Limited 1965*

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Front Cover: This superb action-shot of Mike Duff was taken during last year's T.T. races on the Isle of Man. Mike is a Canadian rider who is sponsored by Tom Kirby with Matchless G50 and A.J.S. 7R machines. Mike is also riding a works Yamaha 250 during the 1965 season.



Trip to Philips

A FEW weeks ago, I had the pleasure of meeting some of the prizewinners in our recent Philips Electronic Kit competition to present them with their prizes and accompany them on a trip around Philips electrical factory at Croydon. A photograph of some of the major award winners is shown below and a full list of prizewinners in the competition is given on page 20.

I think I can safely say that everybody on the Philips trip had a super time and I am sure they will continue to have lots of fun with the Philips Electronic Engineer kits they received.

Write in for Dinkies

While on the subject of competitions, on page 43 of this month's issue of M.M. there is a list of 50 names of readers who were first to send in the correct answer to our Dinky Toy silhouette competition. If your name appears in this list, then write in immediately for your Dinky Toy Austin 1800.

If your name doesn't appear, then you have another opportunity of winning by entering the Dinky Toy competition on Page 38. There is nothing difficult about the competition—simply fill in your name and address and write what you think is the make and model of the car. It is very important that you send in your entry as soon as you receive your magazine as only the first fifty correct answers will be selected. The names of the winners will then appear next month in order for readers to see whether to write in to claim their award.

The only sure way of getting your copy of M.M. early is to place a regular order with your newsagent. It doesn't cost anything and it could mean your winning a Dinky Toy to begin or add to your collection.

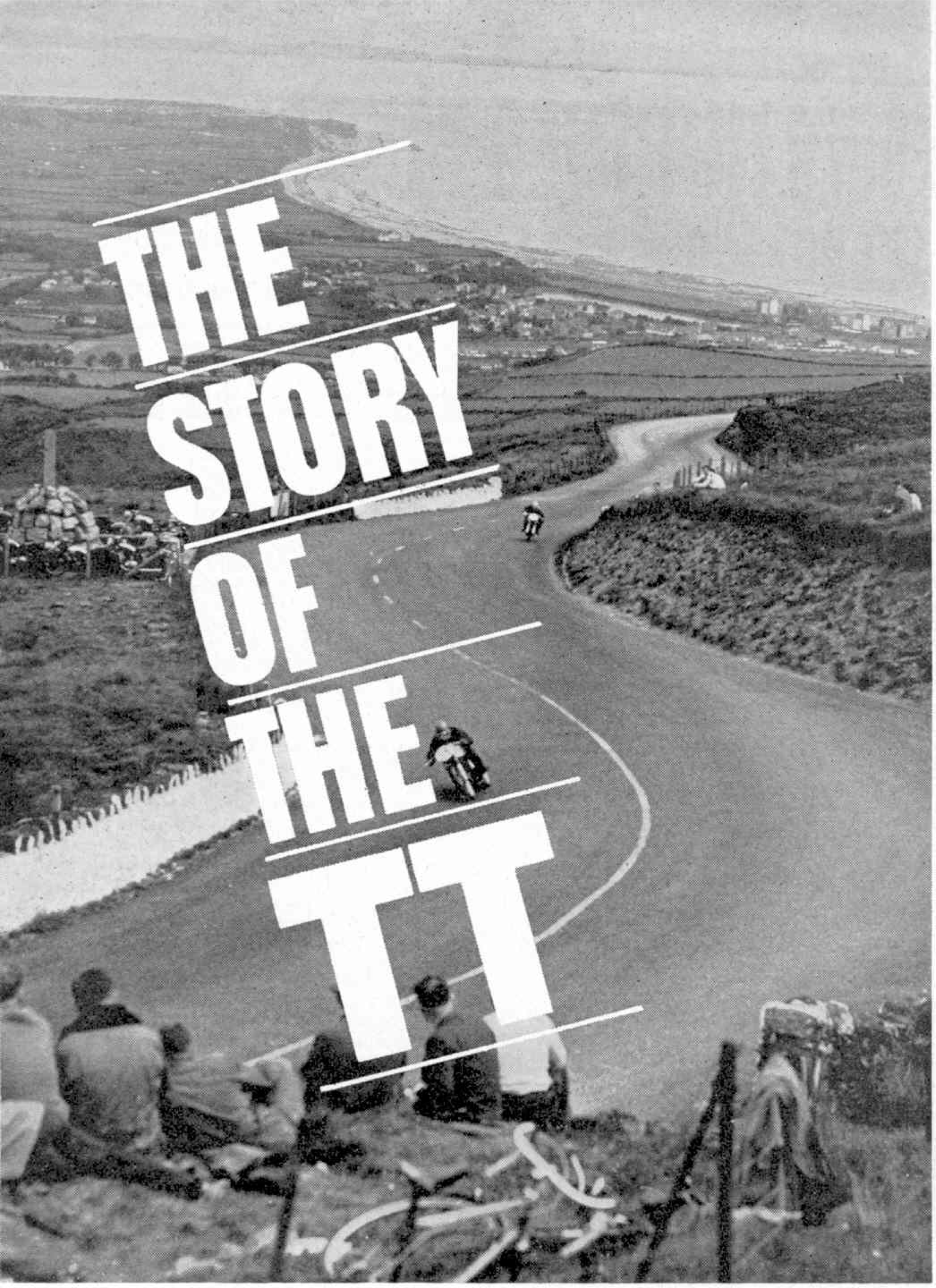
By the way, on the same page as the Dinky Toys' Competition you will find a reader's enquiry form and easy-to-enter sales and wants form. If you wish to use either of these forms, you may send them in together with your competition entry and save postage. Don't delay—send in your entry right away!

Now, after dealing with the subject of competitions, I would like to announce a merger which is of extreme interest to all railway modellers. Triang and Hornby-Dublo have combined forces and in future model railway equipment will be marketed under the Triang-Hornby banner. Full details of this new merger are given on page 35. I am sure that all model railway enthusiasts will find the information interesting.

The Editor

Winners of the Philips Electronic Kit competition in Meccano Magazine were recently presented with their prizes by the Editor.





'THE World's Greatest Motor Cycle Road Races' is the description any motor cycling enthusiast would give to the most thrilling event in the motor cycle sport's calendar, the Isle of Man Tourist Trophy Races. In June this year, as over the past fifty years, thousands of motor cycle enthusiasts will be travelling from all over the world to this tiny island in the Irish Sea to see this exciting event. Surprisingly, it was due to the British Government, which fought against the introduction of motor vehicles on our roads by placing ridiculous restrictions on them, that the Tourist Trophy races went to the Isle of Man.

The history of the T.T. road races dates back to 1906 when, at the annual dinner of the Auto-Cycle Club, later to become the Auto-Cycle Union, it was suggested that races for motor cycles, similar to those in which cars were competing, should take place. However, the 20 miles-an-hour speed limit enforced at that time made road racing in England impossible. Thus the Isle of Man, which then had, and still has, its own Government, was approached. The Manx Government readily agreed to the proposals and with the presentation of a trophy by the Marquis de Mouzilly St. Mars, the first Isle of Man Tourist Trophy races were held in 1907.

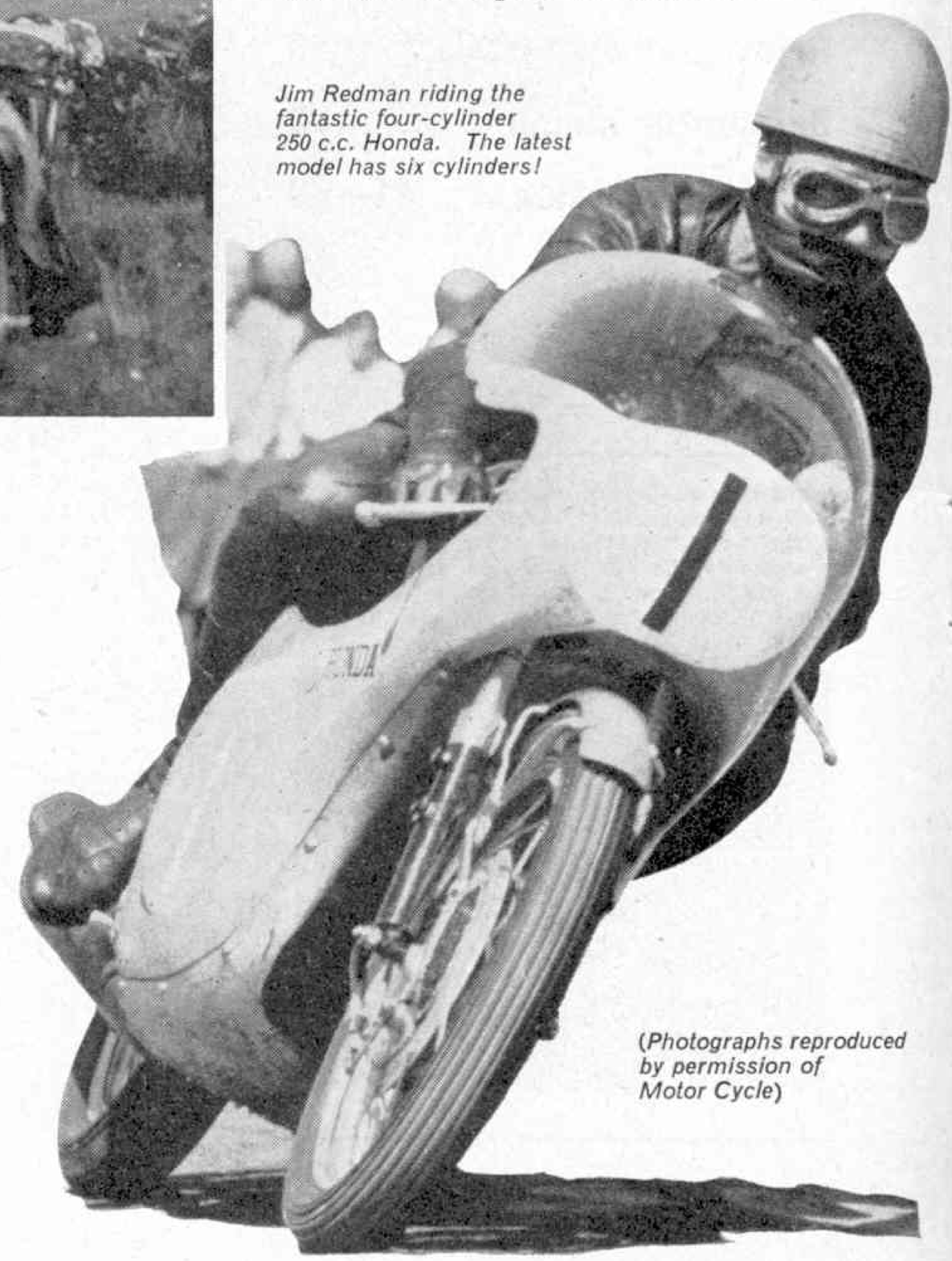
There were two events, one for single-cylinder motor cycles and the other for multi-cylinder machines. Weight and engine capacity did not matter—the only restriction was the amount of fuel carried.

The original course was the St. John's Circuit, nearly sixteen miles long, but after the regulations were changed in 1909 to discard fuel restrictions, bar pedalling gear, and make one race for multi- and single-cylinder machines, it was decided in 1911 to run the race over the 37¾ mile 'Mountain Circuit'. Also, for the first time, in 1911, the races were divided into 'Senior' and 'Junior' events according to engine size. Later, in 1920, a 'Lightweight' event was included and by 1924—a 'Sidecar' race. Finally, in 1925, five races were run—Senior, Junior, Lightweight, Ultra-Lightweight and Sidecar. These events are still held even to the present year, as well as a 50 c.c. 'Tiddler' race.

Over the mountain

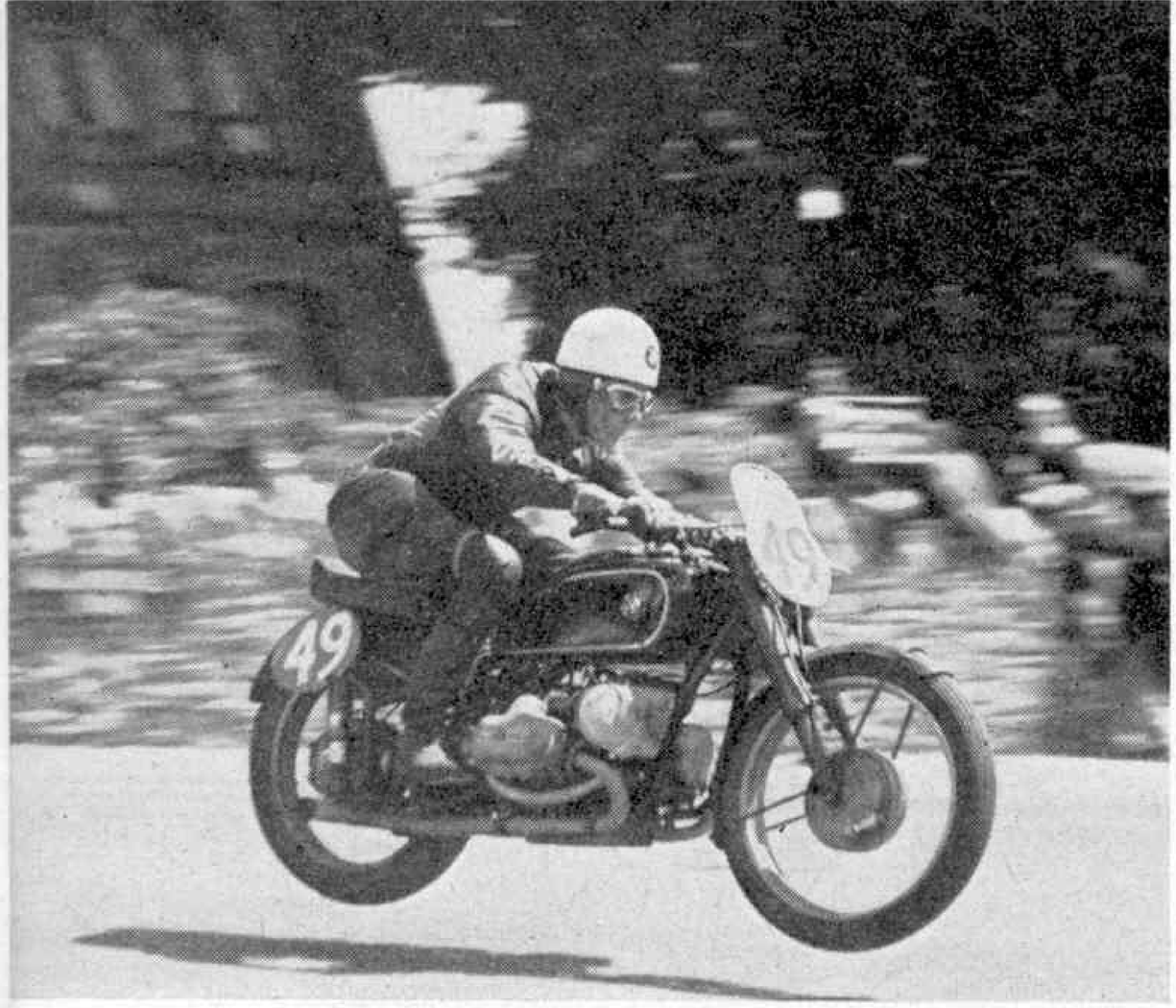
As to the 'Mountain Circuit'—a few alterations were made to the actual course between 1909 and 1922, but the present circuit is the same as in 1922 except that the dusty, narrow lanes of then have been transformed into some of the fastest roads in the world.

The motor cycles used in the earlier T.T's were ordinary road-going tourist mounts which could be bought by anybody. In fact, the speeds on these ordinary machines were so slow and the terrain so difficult to cover, that if a competitor had mechanical trouble and was able to repair his machine in a

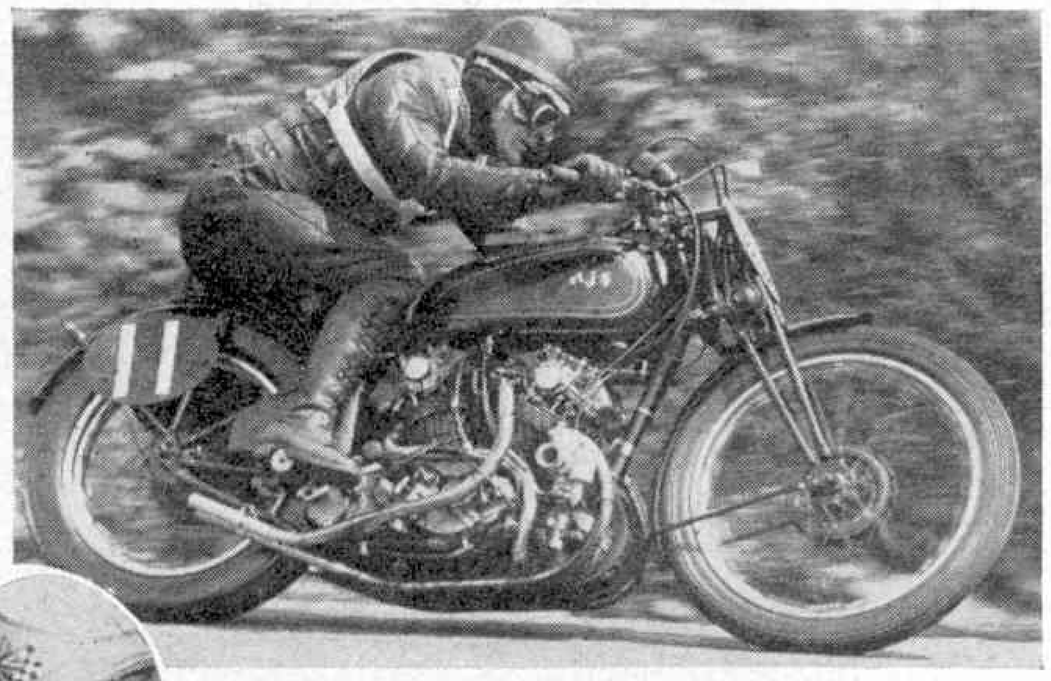


Jim Redman riding the fantastic four-cylinder 250 c.c. Honda. The latest model has six cylinders!

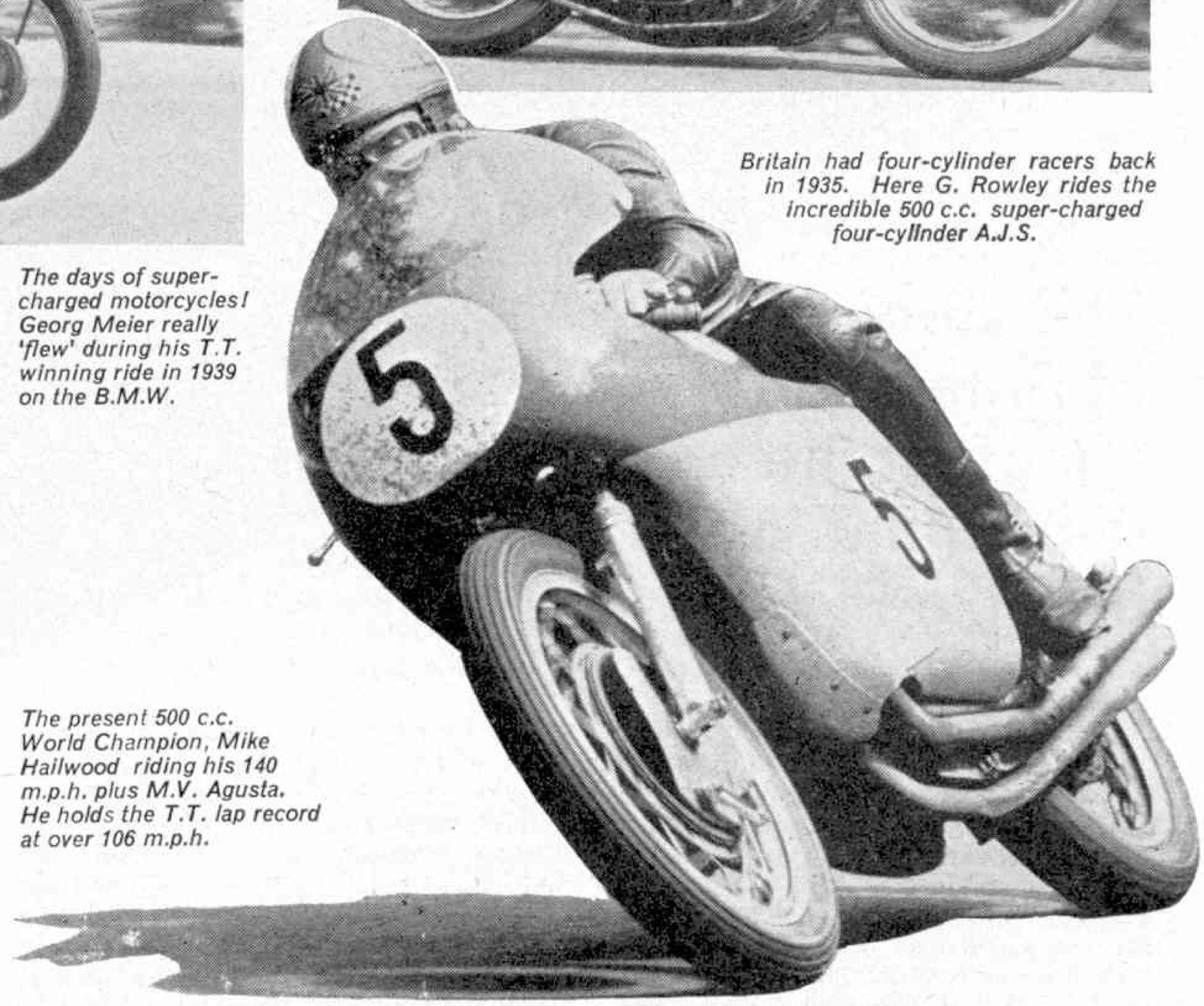
(*Photographs reproduced by permission of Motor Cycle*)



The days of super-charged motorcycles! Georg Meier really 'flew' during his T.T. winning ride in 1939 on the B.M.W.



Britain had four-cylinder racers back in 1935. Here G. Rowley rides the incredible 500 c.c. super-charged four-cylinder A.J.S.



The present 500 c.c. World Champion, Mike Hailwood riding his 140 m.p.h. plus M.V. Agusta. He holds the T.T. lap record at over 106 m.p.h.

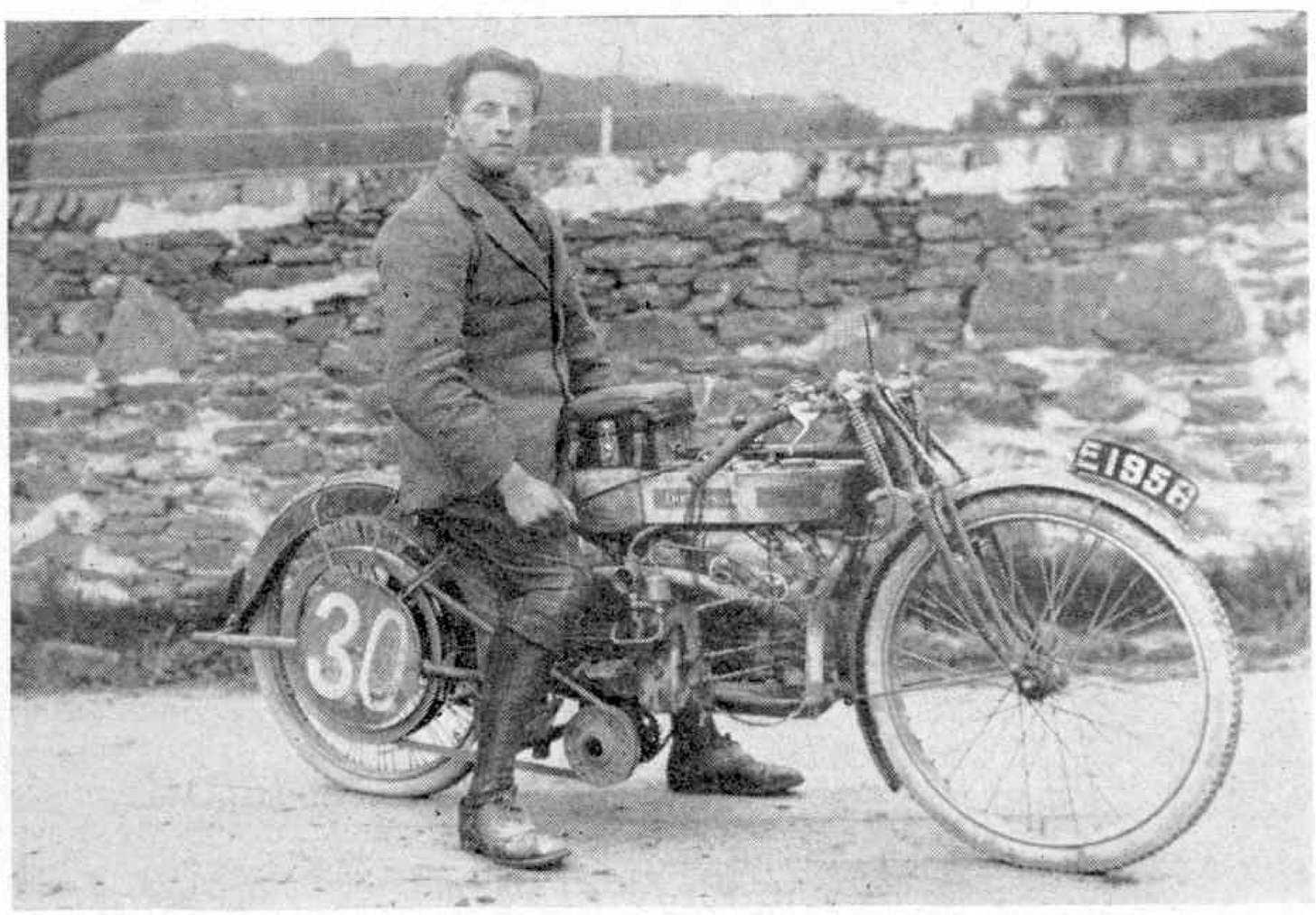
reasonable amount of time, he still had a chance of winning. It was this testing of machines under difficult conditions that brought about improvements to braking, suspension and engine reliability. These improvements were then incorporated in later production machines sold to the public.

However, as speeds increased, so did competition between manufacturers, who tried their utmost to win the coveted T.T. award. Soon special, high-powered motor cycles were being built to be ridden by expert, factory team riders. Today, these special high-powered road racing motor cycles are capable of travelling at over 140 miles-an-hour and bear little resemblance to the ordinary touring motor cycle. Lap records have increased from 42·91 m.p.h. for 1907 to just over 106 m.p.h. for 1964.

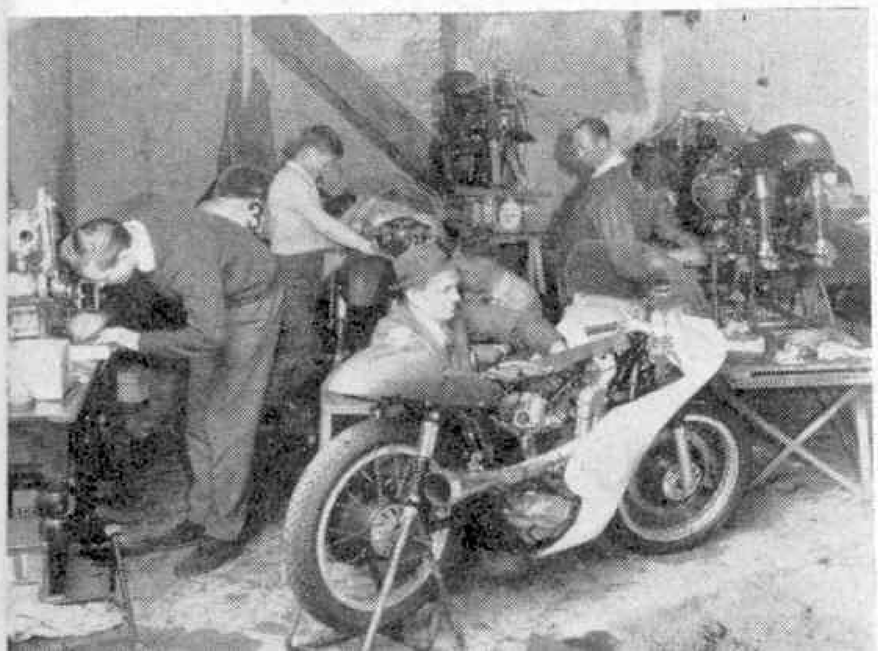
The T.T. Aces

Many men have gained fame because of their memorable performances in the T.T. races and one of the earliest was Stanley Woods. He first raced in 1922 and after winning the Senior T.T. four times, the Junior five times and the Lightweight once, Stanley retired in 1939. Freddie Frith and later, Geoff Duke, were both awarded the O.B.E. for their magnificent efforts in the T.T. on two-wheeled speed machines! Who will be the next to gain such honours? World-famous Britisher John Surtees, not only became World Champion motor cyclist, but last year became the Racing Car World Champion!

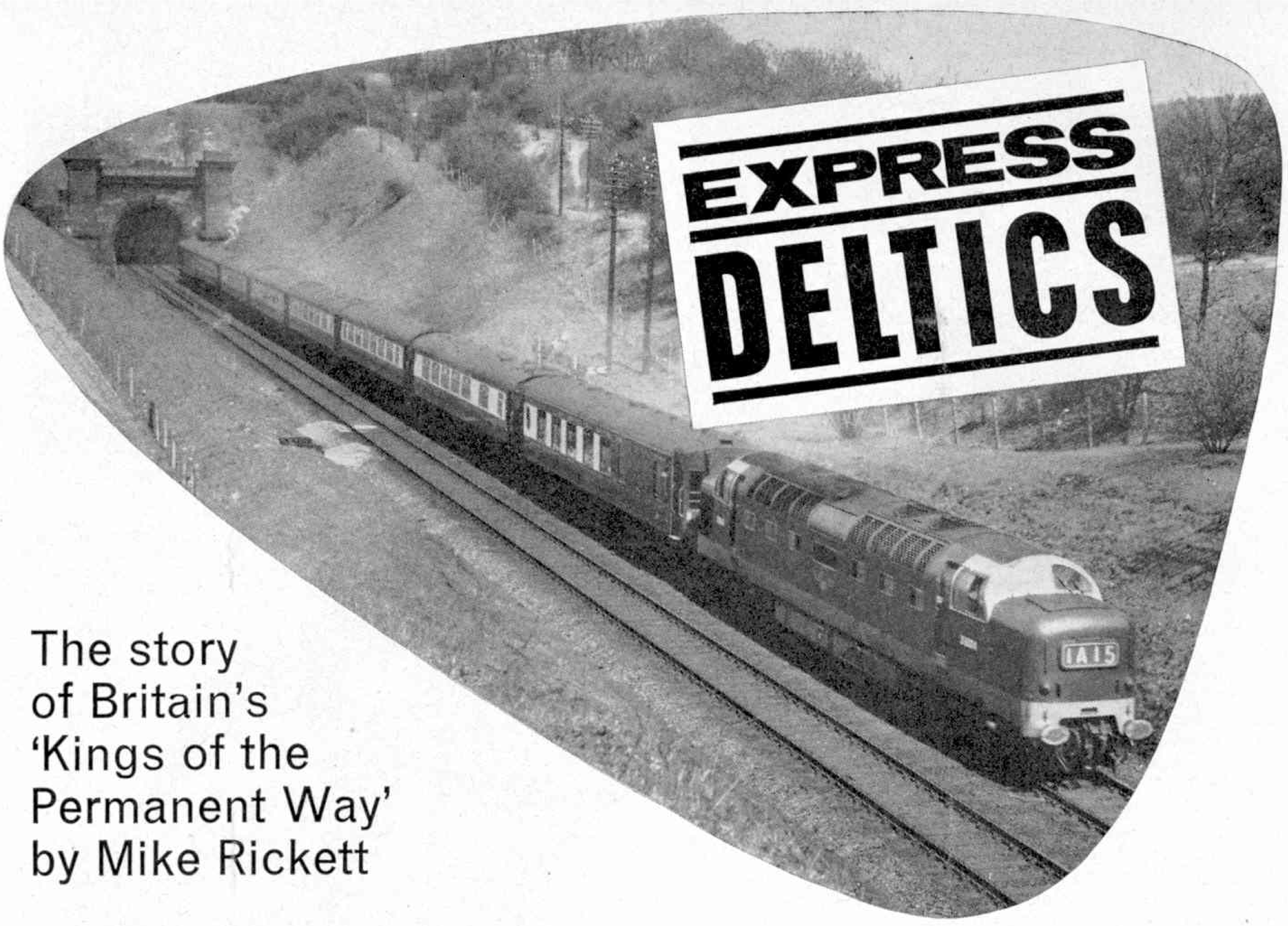
Believe it or not, but machines like this old twin-cylinder Douglas were actually raced in the T.T. This photograph dates back to 1913 and the rider was E. Elwell. Note the belt drive and stirrup-type front brake and large toolbox on the petrol tank to carry out running repairs



Tuning and preparation of the bikes during T.T. fortnight is carried out in back street workshops as can be seen here in Tom Arter's stable!



EXPRESS DELTICS



The story of Britain's 'Kings of the Permanent Way'

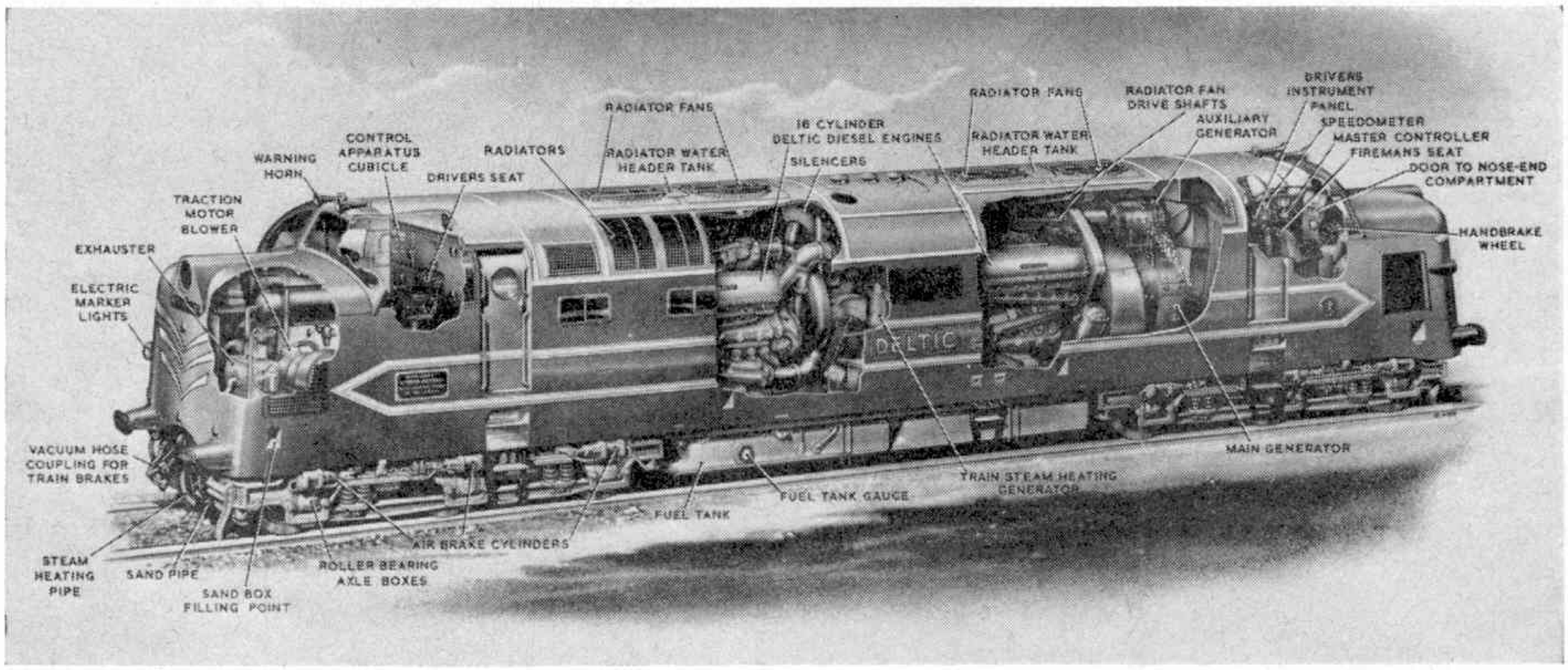
by Mike Rickett

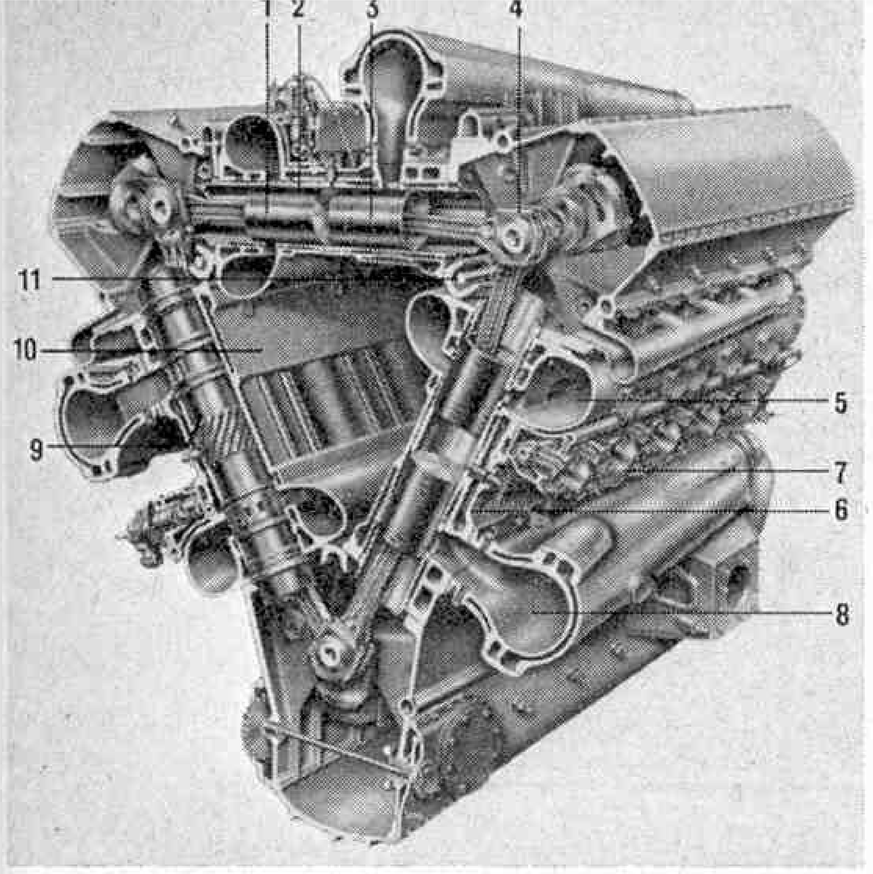
THE most powerful diesel locomotives in service on the British Railways system are undoubtedly the type 5, 3,300 h.p. 'Deltic' locomotives. However, the blue and white prototype of the class, now preserved in the Clapham Transport museum, was not originally designed for use on British Railways, but was built by the English Electric Company in the hope of attracting buyers from overseas.

Its completion coincided with the proposal to electrify the East Coast route from King's Cross to Leeds, a proposal that was to fall through shortly afterwards. The fleet of type 4, 2,000 h.p. diesel locomotives, then owned by the Eastern Region, were considered inadequate for the heavy trains and accelerated services that the region was interested in running. The final result was that B.R. provided English Electric with the means of testing the prototype 'Deltic' locomotive in main line service, principally on express trains between London, Crewe and Liverpool.

One of the more notable feats that the prototype locomotive performed during this test period, when it travelled over 400,000 miles, occurred when a 20 coach train of 642 tons was hauled the 82½ miles from Carlisle to Hellifield, including the long run up to the 1,167 feet high Aisgill Summit. The route has a gradient stretching for 17½ miles, almost all of which is 1 in 100.

The 'Deltic', with its extremely heavy load began its gruelling journey at 72 m.p.h. which by the time the summit





1, Inlet piston. 2, "B" cylinder block. 3, Exhaust piston. 4, Connecting rod. 5, Air-inlet manifold. 6, "A" cylinder block. 7, Fuel cylinder pump. 8, Exhaust manifold. 9, Cylinder liner. 10, "C" cylinder block. 11, Blower drive shafts.

was reached was reduced to 47 m.p.h. Its average speed for the round journey from Carlisle to Hellifield and back, including the ascent to Aisgill in both directions, was 56·2 m.p.h. This proved that the locomotive had sufficient power to sustain tremendous efforts such as that over the arduous route to Scotland.

The 'Deltic' locomotives, powerful though they were, did not find themselves easily accepted into the B.R. fleet and although the Eastern Region were interested in using the locomotives in large numbers, objections were raised by the then B.T.C. The 'Deltic' locomotive was by far the most expensive among the B.R. diesel fleet and compared to conventional locomotives their engines were extremely complex.

Eventually it was agreed that 22 'Deltic' locomotives be built in a slightly modified form and these were allocated numbers D9000-D9021, 11 bearing names. The locomotives were distributed between the Eastern, North Eastern and Scottish Regions, making possible the acceleration of the principal express services on the East Coast route.

A year's mileage

A number of the 'Deltic' working schedules provide for out-and-home London-Edinburgh workings in one day, something previously impossible and it is interesting to note that each 'Deltic' is scheduled to cover 200,000 miles every year, roughly three times that of an average steam Pacific locomotive. It was expected that the 22 'Deltic' locomotives would be capable of dealing with duties that formerly required 55 steam engines.

The 'Deltic' locomotive is powered by two of the highly controversial Napier 'Deltic' engines, which had previously proved themselves in small naval craft for which they were primarily developed. The engine has 18 cylinders and follows the opposed piston principle, with the cylinders grouped triangularly in three banks of six. Each bank contains a crankshaft that is linked by a train of gears to the main output shaft in the centre of the triangle.

The two 'Deltic' engines each develop 1,650 h.p. at 1,500 r.p.m. and each engine is coupled to a D.C. generator, which in turn has an auxiliary generator mounted above it, driven by a shaft from the engine gearbox. This auxiliary generator supplies current at 110 volts for field excitation of the main generator.

The load is shared by both generators when the two diesel engines are running and if the locomotive should be working from one engine only, the full auxiliary load can be taken by the one auxiliary generator. Power is transmitted to the locomotive driving wheels by six traction motors. These are mounted on the axles, which they drive through single reduction gears.

The major part of the control gear is housed in two cubicles between the driving cabs and engine compartment, while the driving controls are generally similar to other types of main line locomotive built by English Electric. Warning lights in each driving position indicate engine shut-down, wheel slip, a general fault or an indication of a boiler shut-down. The general fault light is linked with secondary fault indication lights in the engine compartment which further details the fault as, for example: low water level, high water temperature or a traction motor blower failure.

The bogies of the locomotive are of the equalised type with centre bolsters and three motorised axles. The superstructure is carried on four side bearers on each bogie bolster and the load is transmitted through coil springs to two spring planks.

The Westinghouse brake equipment is arranged for straight braking of the locomotive and for vacuum control of the air brakes when hauling vacuum braked stock. The superstructure itself is arranged with a long central compartment, a driving cab at each end of this compartment and a nose end in front of each driving cab.

Automatic heating

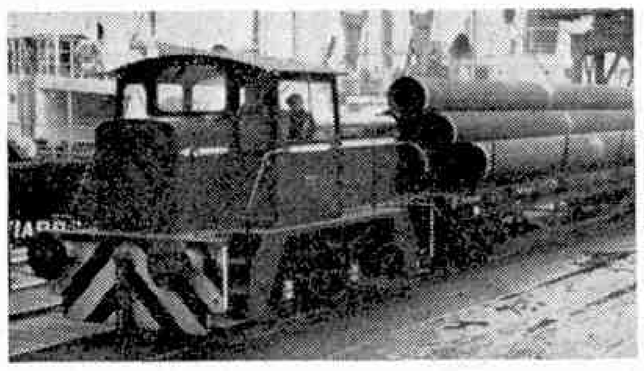
The central compartment accommodates the two power units together with the automatic train heating steam generator, which is placed in the centre of the locomotive between the power units. Also in the centre is the storage battery, which is divided so that half is placed against each side of the locomotive.

Control cubicles at each end of the compartment, form rear bulkheads for the driver's cabs. The inside compartments accommodate the air compressor and vacuum exhausters in opposite ends together with the traction motor blowers. One nose compartment also contains a toilet and wash basin adjacent to the compressor.

Railway Notes

New industrial locomotive

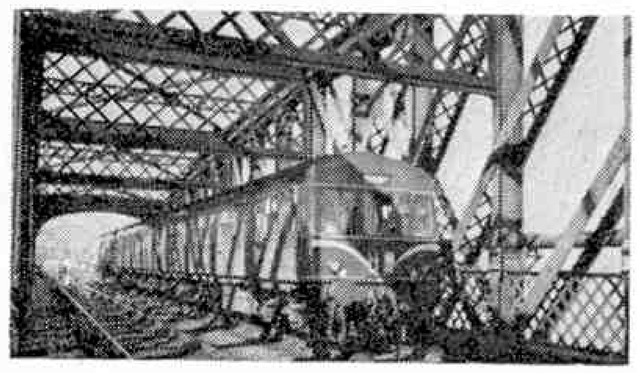
A 24-ton diesel hydraulic locomotive has recently been delivered to the Tyne-Tees Steamship Company Ltd., at Middlesbrough. The locomotive 'Tyne-Tees No. 6', maintains a connection began over half a century ago when Tyne-Tees bought the first of many steam locomotives from Robert Stephenson and Hawthorne—now part of the English Electric Group. 'Tyne-Tees' diesel locomotive fleet includes two mechanical shunters also built by Stephenson's. The new locomotive follows essential Stephenson design and includes such features as a centre cab with rear entrance, duplicated controls, inset shunters' footsteps and roller bearing axle boxes.



A face lift for the Tay Bridge

The Tay Bridge, after nearly eighty years of continuous service, is undergoing its first major overhaul. Railway engineers have just completed the renewal of the bridge's massive expansion bearings—a twelve year undertaking. Now that this stage is finished they have begun to replace sections of the trough flooring which carries the permanent way. The two mile long bridge, which was opened for traffic in 1887, carries heavy, main-line traffic and indeed will continue to do so for many years.

The bridge consists of seventy-two spans, of deck girder construction and, over the navigation channel, thirteen high spans of through girder construction. The girders rest on wrought iron piers founded on iron cylinders sunk in the sand of the river bed and filled with concrete. The heavy expenditure that this operation will entail, £100,000 a year for five years, will structurally improve the bridge and with modern paints and methods of application, will extend the painting and minor repairs cycle from four years to eight or possibly more.



New face of British Railways Show

The British Railways modern image show, held in Lewis's store, Liverpool, included a model of an electrified railway system built by British Insulated Callender's Construction Company, who are responsible for all erection of the overhead traction equipment between Liverpool and Crewe.

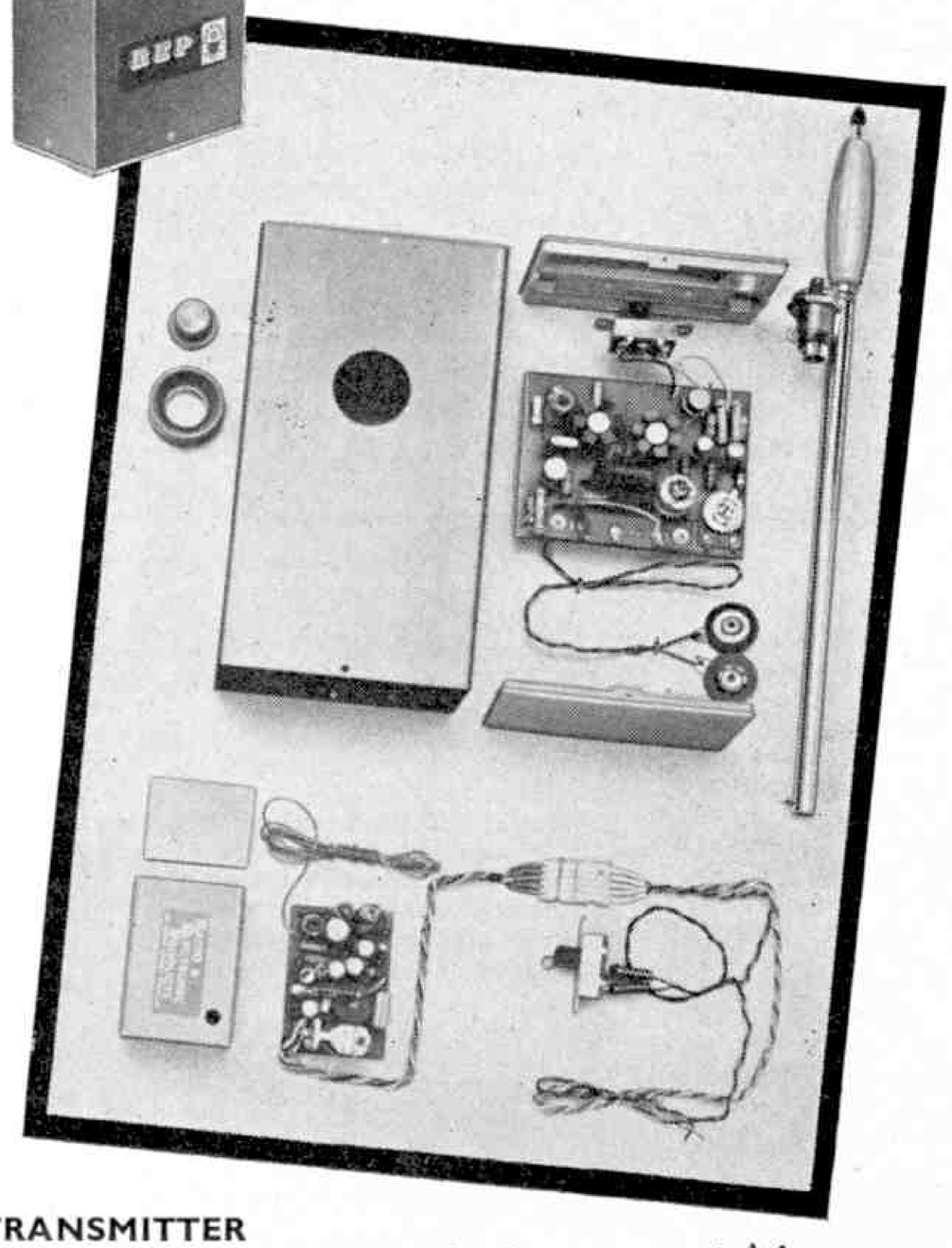
During the first week of the exhibition, a total number of 36,680 people visited the show, over 4,000 more than when the exhibition took place in the Design Centre, London. Among the exhibits at the show were models of British Railways new stock, illuminated photographs of new installations and a full size mock-up of one of British Railways new coaches.

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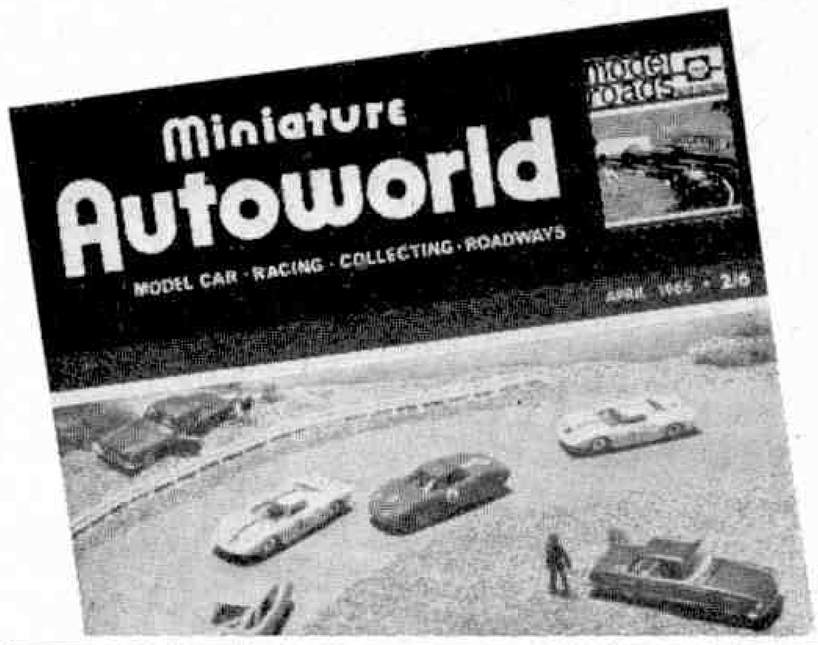
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Anything interesting . . . write about it to the editor



☐ **Historical Photograph — The photograph above will soon be of historic interest and value because the steam locomotive illustrated is soon to be taken out of service. Oddly enough, when the photograph was taken at the Central Station, Hanover, the successor to the old engine was standing alongside.**

A comparison between the two engines shows distinctly the advantages of the present-day electric locomotives. For example, the old steam locomotive which was built in 1939 weighs 135 tons, produces 1,625 horse-power and has a maximum speed of 50 miles-an-hour. The electric locomotive weighs 126 tons, develops 6,000 horse-power and has a top speed of 65 miles-an-hour plus.

During the steam engine's life it covered 4½ million miles, used approximately 30,000 tons or 5,000,000 shovelfulls of coal!—*Hans Kutschbach, Hannover-Westerfeld.*

■ **The First Railway 'Phone**—It is not generally known that the credit for the introduction of telephones on railways belongs to the Midland Railway Company. In the year 1920, I observed in a neat frame in the Telegraph Superintendent's Office at Derby Station, the following letter from Mr. W. E. Langdon, telegraph superintendent of the Midland Railway Company to Mr. W. L. Newcombe, the company's Goods Manager. This letter bore the date of April 4th, 1878 and was historically interesting because it referred to the first telephone used on any railway. The instrument must also have been one of the very first used in Britain. The letter read as follows:—

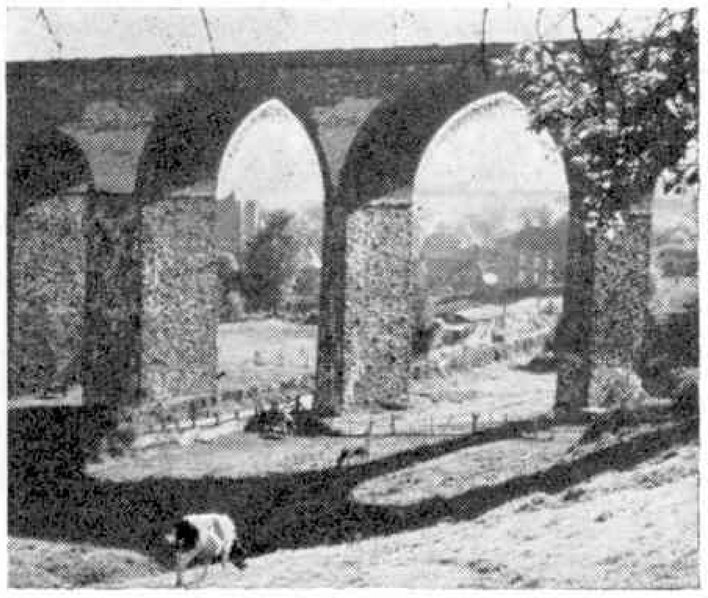
'Dear Sir,

Should you feel interested in testing its capabilities, I beg to acquaint you that I have now telephone communication in operation between my office and stores in Siddals Road.

I am, dear sir,
Yours faithfully,
W. E. Langdon.

Mr. Langdon was responsible for the provision of telephones between all signal boxes and all the telegraphic instruments used in connection with the block system of signalling. He died in 1905, aged 73.—*A. B. Longbottom, Ashton-on-Trent, Derby.*

☐ **A Cyclist's Way?—The viaduct shown here was built in the last century to carry trains serving the busy North Somerset coalfields. Two of these mines were near the village of Pensford, which can be seen between the arches of the viaduct. Unfortunately, the viaduct will soon become redundant as the passenger services on the line have ceased and the line itself is shortly to be closed.**

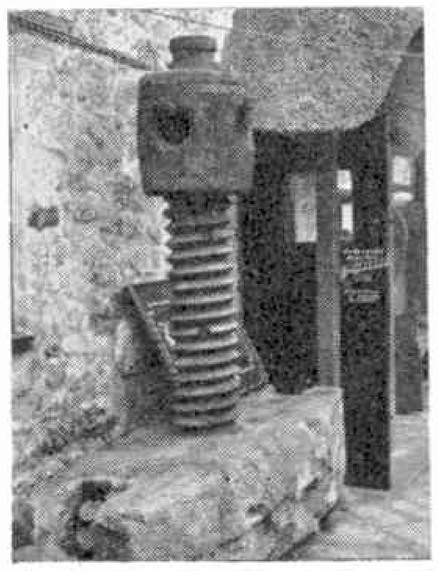


There are sixteen arches, some more than a hundred feet high, and the viaduct has quite recently been carefully restored. What will be its future? It is difficult to hazard a guess, but couldn't this line, which runs quite level through some very hilly and picturesque countryside, be utilized as a cyclists' way? It does seem a pity for it to fall into decay.—*N. W. Kieffer, Stanton Drew, Bristol.*

■ **Devon Cider** — I have often wondered how the Devon and Somerset cider makers managed to extract the apple juice from the apples used to make cider. I imagined they used all sorts of complicated equipment until I discovered this old cider press behind the Harbour Inn at Axmouth, near Seaton, in Devon.

The press is made entirely of wood and, as can be seen, the screw is an exceptional piece of craftsmanship. I wonder how the hole was cut to receive it in the block?

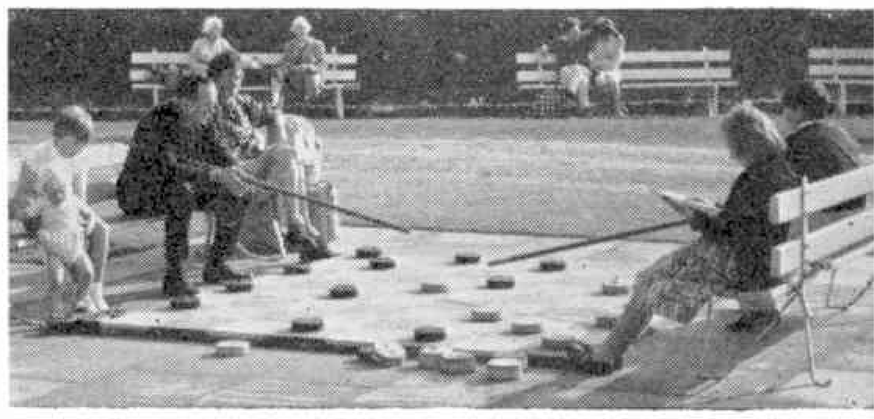
A giant cider press screw as seen at the rear of the Harbour Inn, Axmouth, Devon



As you will probably realise, this ancient relic of the county is of great interest and curiosity to the many visitors to the inn.—*Frank Rodgers, Allestree, Derby.*

☐ **Draughts in the Sun**—One of the unusual tourist attractions which can be seen at one of the municipal parks in Oban, Argyllshire, is an outsize, outdoor draughts board.

This unusual exhibit enables visitors to enjoy the sun and a leisurely game at the same time. It appears from my photograph, that people of all ages are attracted by the game.—*G. J. Williams, Blacon, Chester.*



■ **Church of Skulls**—On a recent visit to Hythe in Kent, I went to a small church which is set on a hillside overlooking the main shopping centre. There, in the crypt, are rows and rows of human skulls lying upon shelves.

This sight is not really as macabre as it sounds and many people visit the church to see this interesting display! I believe the collection of skulls came from a communal grave which dates back to the plague.—*M. Edwards, Bramdean Cres., Lee.*

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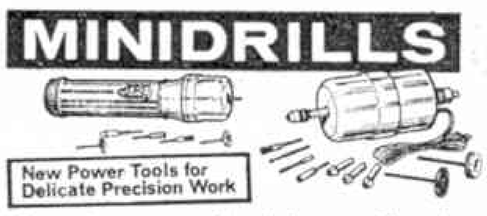
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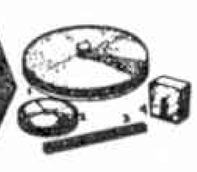


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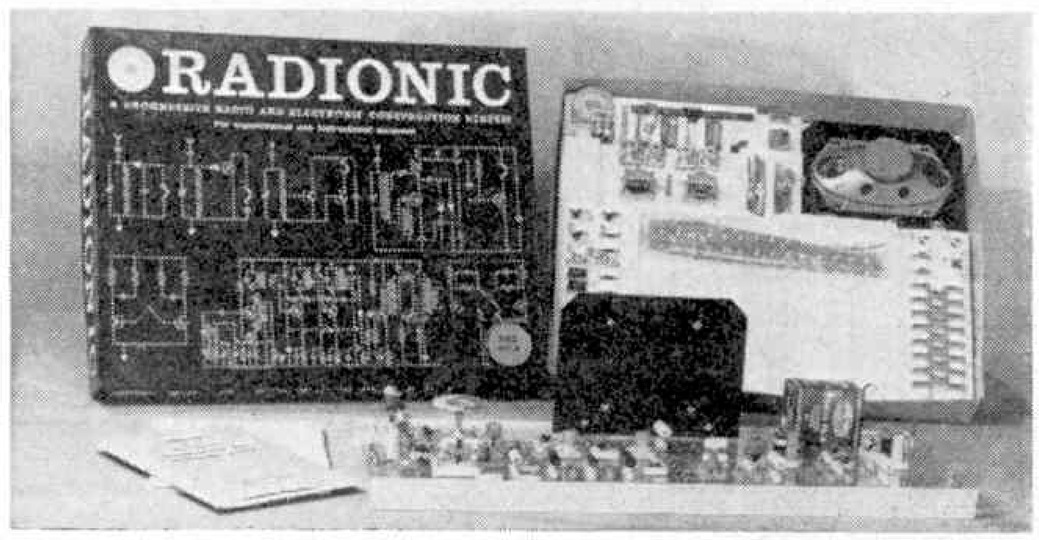
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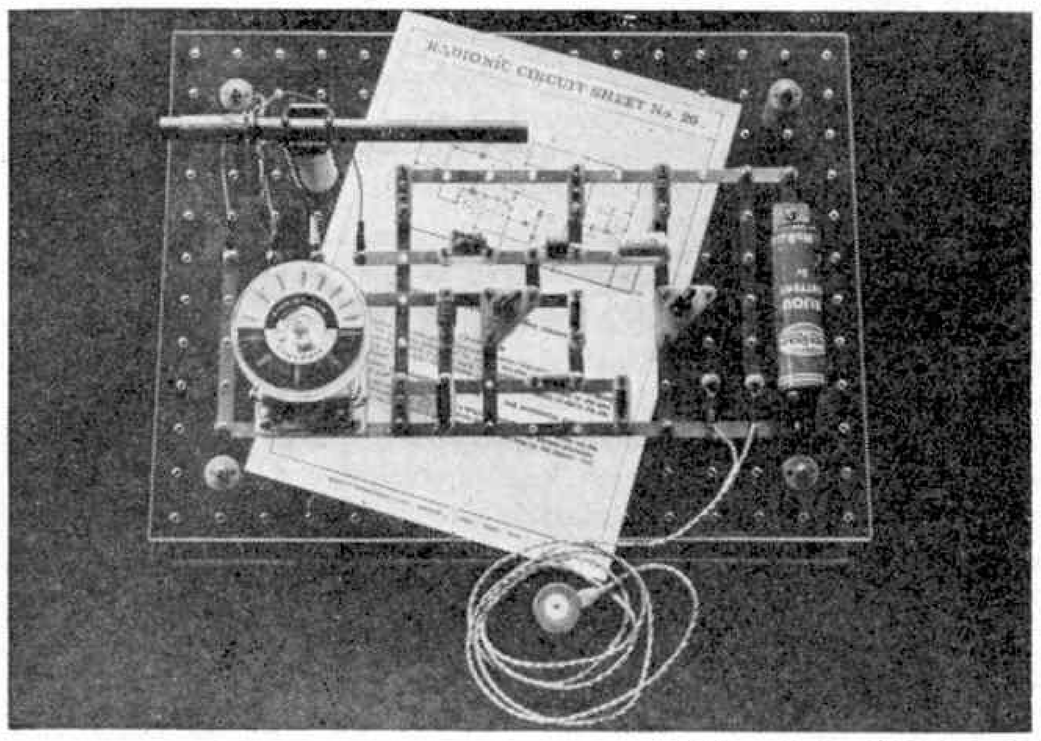


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Marking time

Q. *Which stroke of Big Ben marks the beginning of the hour?—'Hair-spring,' Great Bentley, Essex.*

A. The first stroke of the hour bell, which follows the chimes. This was one of the conditions laid down by Professor George Airy, Astronomer Royal, in 1846, when he was asked to prepare specifications for a national clock. He prescribed that it should register the time, correct to one second per day, by the first stroke of the hour bell and that it should telegraph its performance twice a day to Greenwich Observatory. The clockmakers said that such precision was impossible, but the five-ton clock was completed in 1854 and went into service five years later. Apart from a few stoppages, it has never been more than four seconds out and has run for weeks to within one-tenth of a second per day.

Tumbler tip

Q. *How does a spoon placed in a drinking-glass save it from cracking when hot water is poured in?—T. W., Oxford.*

A. That tumbler cracks because the glass expands on the inside much more quickly than it does on the outside, especially if it is fairly thick. A spoon helps to cool the water as it is poured in, allowing the glass time to adjust to the higher temperature.

Shocking fish

Q. *How does the electricity get into the electric eel?—Roger Ashmore, Blaisdon, Glos.*

A. It is generated by the eel itself, through specially adapted tissue in the tail-muscles which form four-fifths of its body. This tissue comprises what is virtually an electric battery, making a six-foot eel capable of delivering a shock equal to 400 volts—enough to kill or stun its prey. It is found in Brazil and has more relationship to the loach than the common eel, which it resembles only in appearance. About 50 other species of fish can also deliver electric shocks, various parts of their bodies being adapted for this purpose.



Spare hole?

Q. *I have noticed that some village stocks had five holes instead of the usual four. Do you know why?—Robert Cowen, Sutton Coldfield.*

A. I cannot find the answer to this question—unless it is that more than two men could be accommodated when necessary by securing only one leg. Or, if the holes varied in size, some might be more suitable for imprisoning offenders with slimmer legs—women or boys, perhaps?

First mention of the use of stocks in England was in 1350, when the Statute of Labourers decreed they should be installed in every town. In 1376 every village was required to provide them. A whipping-post usually adjoined the stocks.

Strip teaser

Q. *What is a Mobius strip?—'Baffled,' Chichester.*

A. A German mathematician who lived 100 years ago has given his name to the phenomenon of the 'surface of Mobius,' which has been exploited by magicians. It belongs to the study of topology, or 'rubber-sheet' geometry. Take a long strip of paper and twist it through 180 deg. before joining the ends together. Trace along the middle of the strip with a pencil and you will come back to where you started; yet 'both' sides will show the pencil mark, proving that the strip has only one surface and one edge. And if you cut along the line you have drawn, you will have a single band of paper. Only if you make your cut about a third of the width from the edge and go round twice will you divide the strip into two pieces.

Bad Billy

Q. *Can you tell me anything about a film in which Paul Newman played Billy the Kid?—R. G., Beaconsfield.*

A. The film was *The Left-Handed Gun*, shown here in 1958. It was based on a play by Gore Vidal and directed by Arthur Penn, and it was considered unusual in its attempt to present an authentic picture of the famous badman. Since he first went to Hollywood, Paul Newman (*see picture*) had itched to play the character on the screen, stripping him of the false glamour which surrounded him and showing him as the ruthless killer he actually was.

For birdwatchers

Q. *I want to take up birdwatching seriously. Is there any club I can join?—G. J. S., Dorking.*

A. Yes—the new Young Ornithologists' Club, which can put you in touch with people who will advise you. The club organises local field trips, competitions, and special courses for its members. It is also making new surveys of bird life in which advanced members can participate. In a recent exercise all members were asked to report when they first heard the cuckoo in their area, in order to settle the question of its time of arrival in this country. Address of the club is The Lodge, Sandy, Bedfordshire.

Big count

Q. *How often is a census taken in Britain?—'Noddy,' Leamington, Warks.*

A. Since 1801 a census has been held every ten years; the last was in 1961. But so many changes are taking place, and the population increasing so fast, that a special 'sample' census is to be taken next year—on Sunday, April 24—to bring our statistics up to date. By limiting the count to one in every ten households, the cost is expected to be £2 million instead of the £5 million spent last time.

Gogglebox growth

Q. *How many TV sets are there in this country compared with ten years ago?—'Viewer,' Woking.*

A. According to a recent survey, 15 million British homes now have television. In June 1955 the number of licences issued had reached 4,676,000, and by October that year it had passed the five million mark.

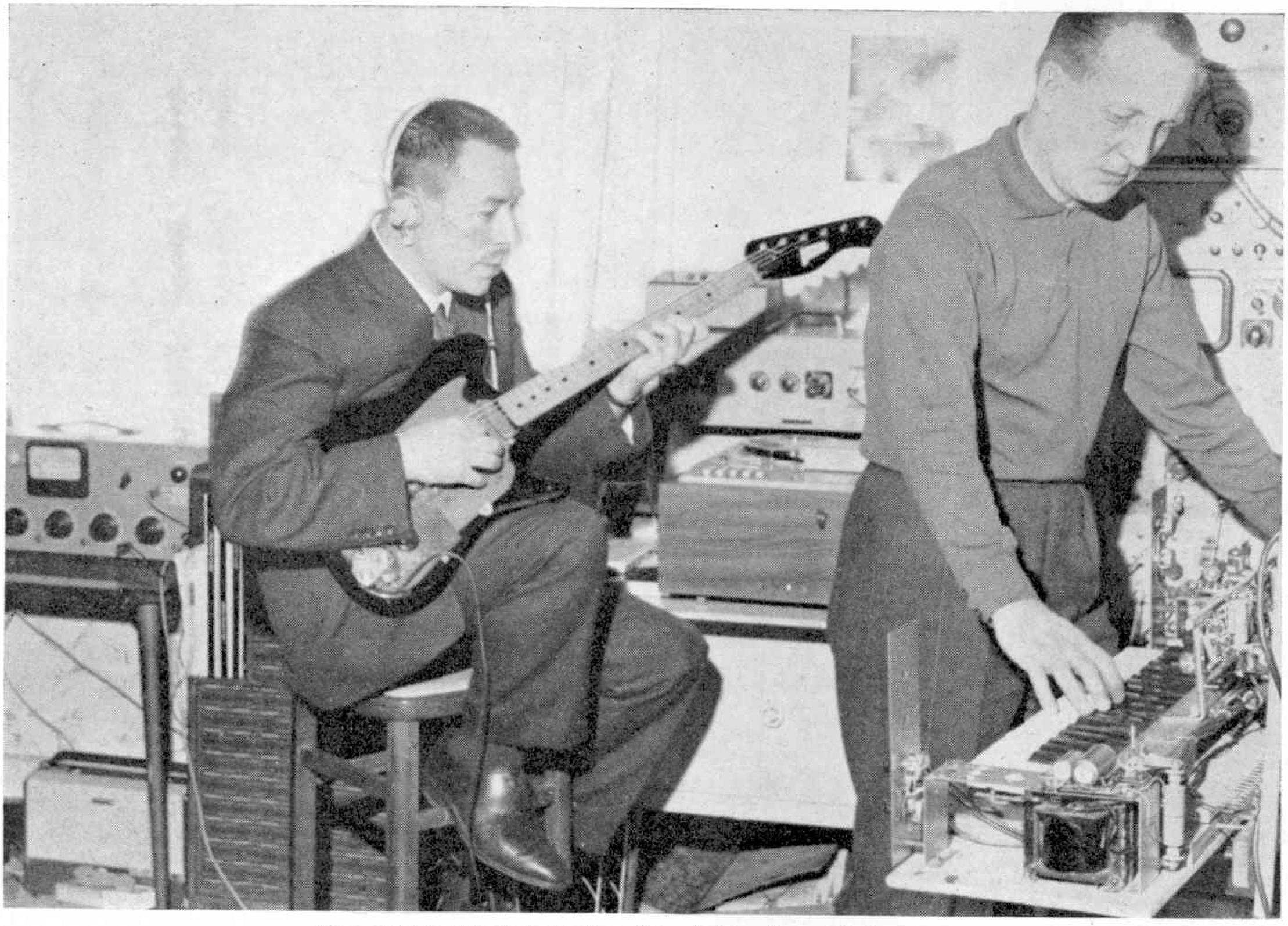


Fig. 5. Making a multi-track recording with an electric guitar and electronic organ

electronic music

by F. C. Judd A.Inst. Mech. E

ONE of the most fascinating music developments during the past ten years has been the electric guitar and today, practically every popular record features this unique instrument with its multi-tonal effects. A close second in popularity to the guitar, is the electronic organ, for this instrument can also produce multi-tonal effects, not to mention the so-called 'gimmicks' such as echoes and vibratto (variations in pitch or loudness).

Electronic Music

Apart from electronic musical instruments with unusual tonal qualities, there is also an entirely new form of music known as Electronic Music, which has nothing to do with electric guitars or electronic organs. It is produced from various kinds of tone and noise generators and composed on magnetic tape with the help of one or more tape recorders.

Fig. 1 shows a corner of the B.B.C. Radiophonics Workshop. Radiophonics is another name for electronic music and if you have a tape recorder about your house, you can try out simple electronic or radiophonic effects by making interesting new rhythms.

You first record different sounds on tape, preferably percussion sounds by tapping boxes and various other objects in front of the microphone. Then you cut these sounds from the tape and form them into a loop like that shown in Fig. 2. When this loop is put on to the tape recorder, it will go round and round to produce perfect rhythm.

Try experimenting with different sounds and different lengths of tape and sizes in loops and if you want to hear what can be done by studios like the B.B.C. Radiophonics section, get either one of the following records:

1. 'Dr. Who' (theme music from the B.B.C. TV series), Decca F.11837;
2. 'Time Beat'/'Waltz in Orbit', each side of Parlophone 45R4901.
   (Both records are by the B.B.C. Radiophonics Workshop.)

These records feature tape loop rhythms and something else which you can build yourself—*a keyed tone oscillator which is the basis of all electronic organs.*

A Simple Electronic Organ

The circuit of the Radionic electronic organ is shown in Fig. 3. It consists of a two transistor oscillator, known as a multi-vibrator, which produces a very

pleasing tone. Part of the circuit is controlled by a series of contacts or keys, each one producing a different pitch when the resistors are appropriately 'tuned'.

There are 15 keys in all, not all shown in the circuit and these, or rather the variable resistors connected to them, can be tuned to whole notes; thus providing two octaves or, to what is called the tempered scale, which contains half notes as well. In other words, you can tune this simple electronic organ to the white notes on the piano from Middle C to C two octaves higher or to the tempered scale, which includes the half notes, from Middle C to D, just over one octave higher.

Organ in a kit

The complete kit for building this instrument can be obtained from Radionic Products Limited and is called the 'Electronic Organ Set' (Fig. 4). It costs £3 17s. 9d., plus 3s. postage, which includes the complete set of instructions and plans for building. Owners of Radionic Set No. 4 can buy the 'Additional Parts Set' for £1 18s. 3d., plus 1s. 6d. postage, and those who have Radionic Set No. 3 can buy the 'Additional Parts Set' for £2 3s. 3d., plus 1s. 6d. postage.

Each of these sets contain the parts necessary to build the Electronic Organ from either of the sets mentioned and, of course, include the instructions and plans.

The Radionic Electronic Organ does not have a loudspeaker or amplifier, but it does have enough power to operate a pair of headphones. However, the Radionic Set No. 3 will build a complete amplifier and loudspeaker which can be used with the electronic organ.

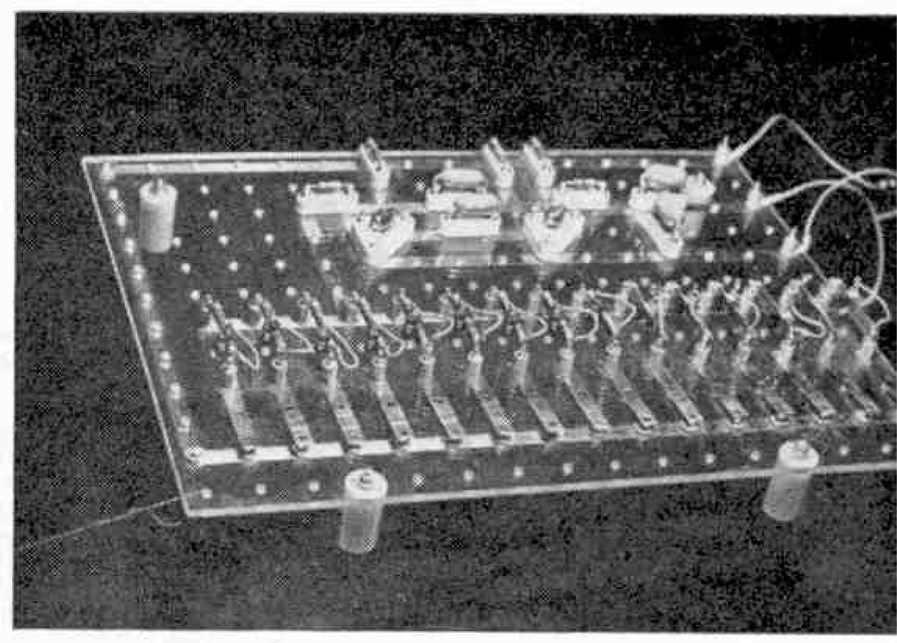
On the other hand, if you have a tape recorder, you can plug the electronic organ straight into it and (a) use the tape recorder as an amplifier or (b) record your electronic organ and hear yourself playing. One could, of course, use a radio set as an amplifier, providing it has a 'pick-up' socket to which the electronic organ can be connected. **However, consult someone with more experience of radio sets before doing this and do not make connections with the set plugged into the mains. Warning: On no account attempt to connect the electronic organ to a radio set which operates from both A.C. and D.C. mains. These sets have live chassis.**

More About Radiophonics

With the help of a tape recorder, as mentioned earlier, some fascinating 'loop rhythms' can be produced. If you play a guitar or can build a simple electronic organ like the one described, you can start producing simple radiophonic music, by playing the guitar or organ or, in fact, any musical instrument with the rhythms (Fig. 5).

With two tape recorders, the combinations of rhythms and effects are limitless, because you can record from one machine to another, adding new melodic lines one upon the other. This is something that might be done at school if the tape recorders etc. are available.





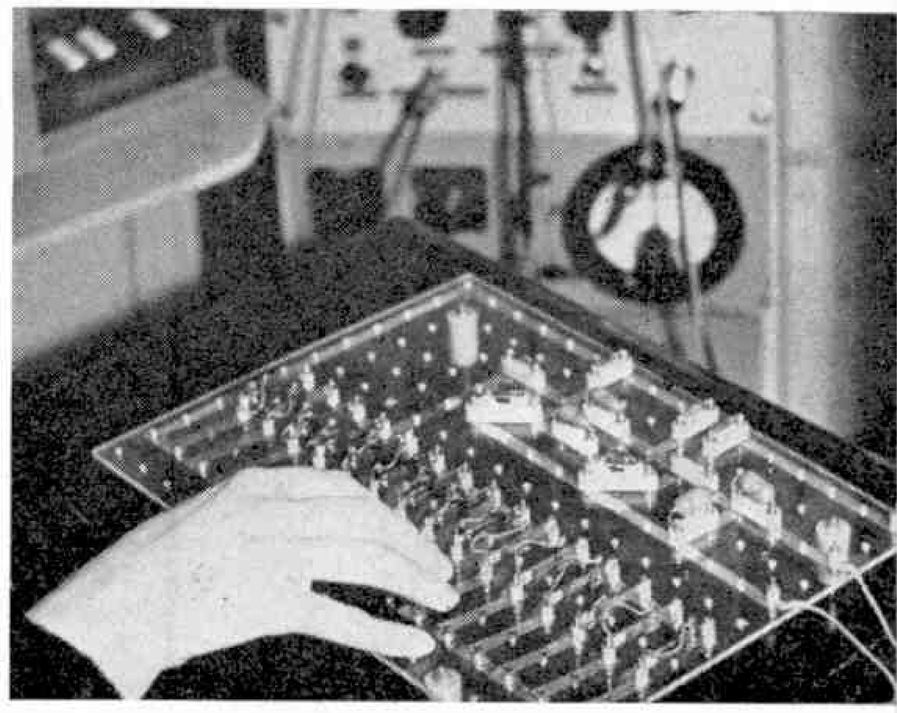


Fig. 1 (above left): A corner of the B.B.C. Radiophonics studio. The special tape recorder in this studio can record on eight tracks, all at the same time

Fig. 4 (right and above right): The completed Radionic Electronic Organ is very simple to construct and can be built from the 'Electronic Organ Set' by Radionic which costs £3 17 9d

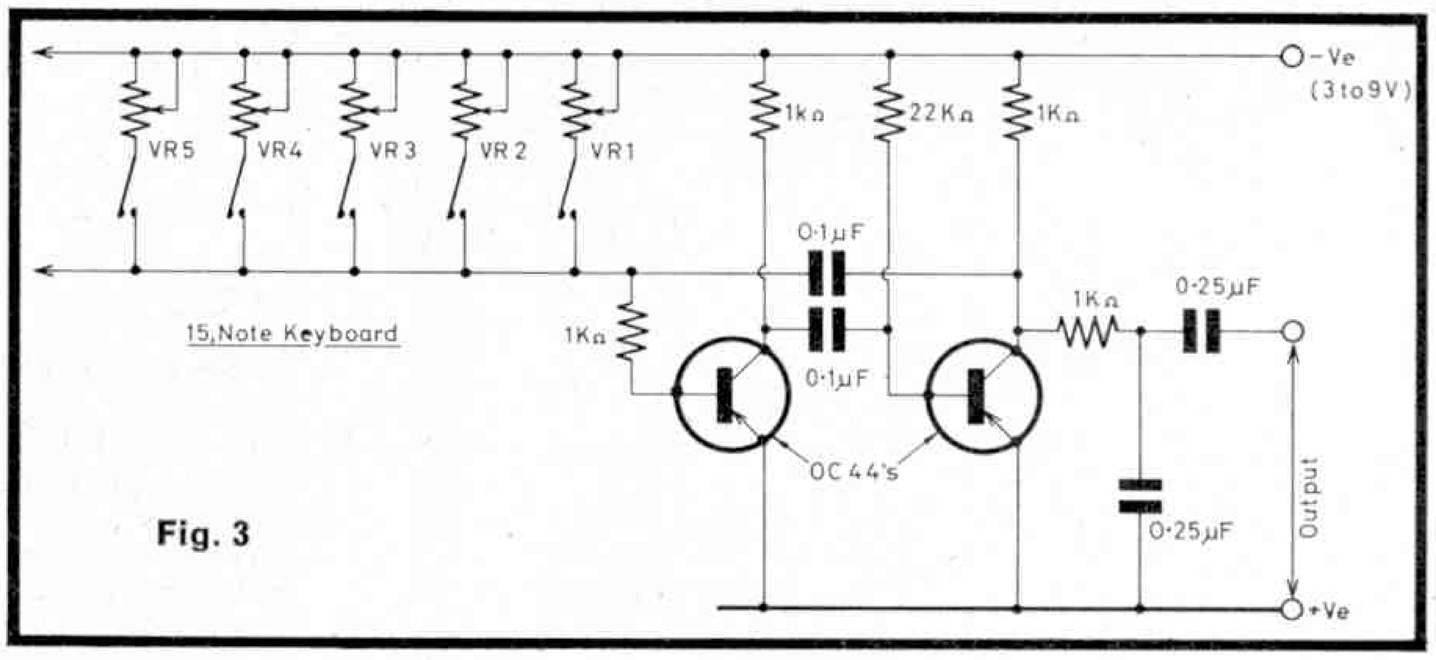


Fig. 3

Fig. 3 (above): The wiring circuit for the Radionic Electronic Organ. Fig. 2 (below): A rhythm loop is made by splicing together 4 pieces of tape with recorded sounds and 4 pieces of blank tape (leader tape with no coating) Start off by using sounds and blanks about 2 inches long and play the loop at a tape speed of 7½ inches per second

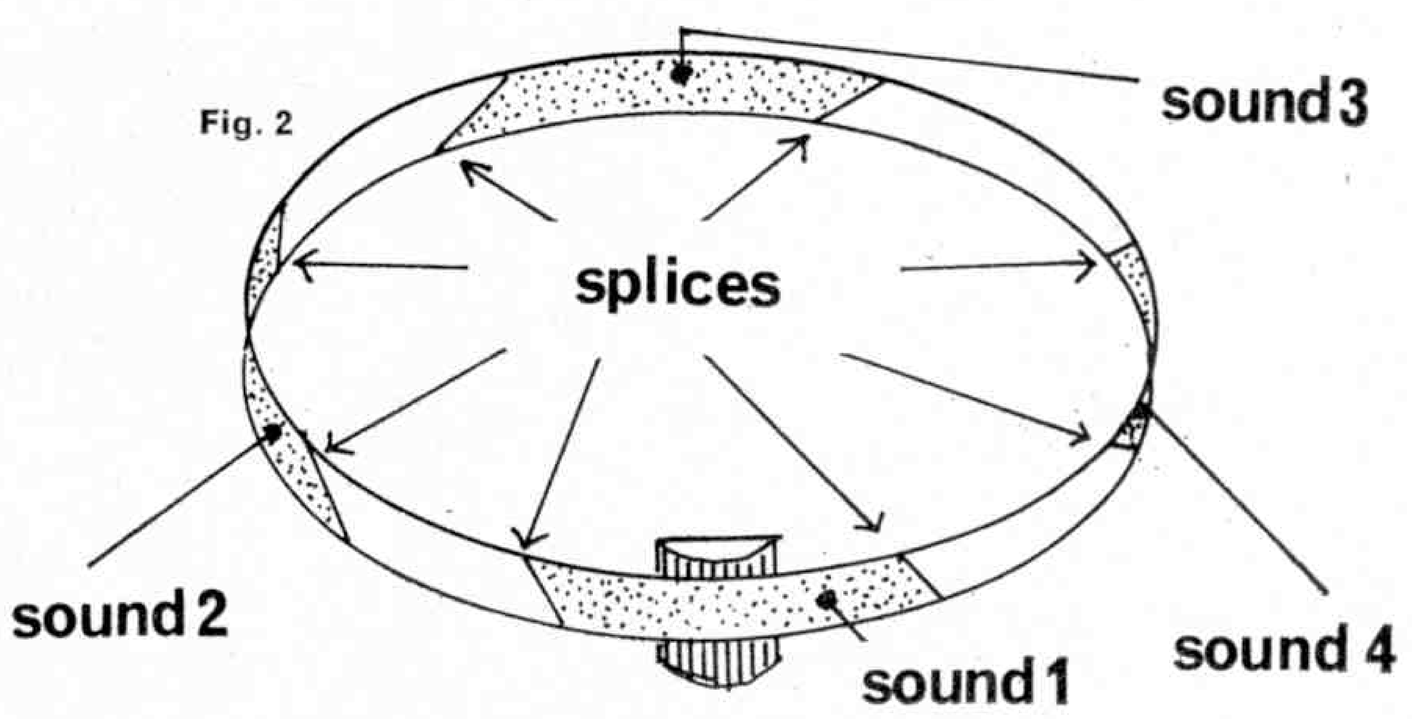
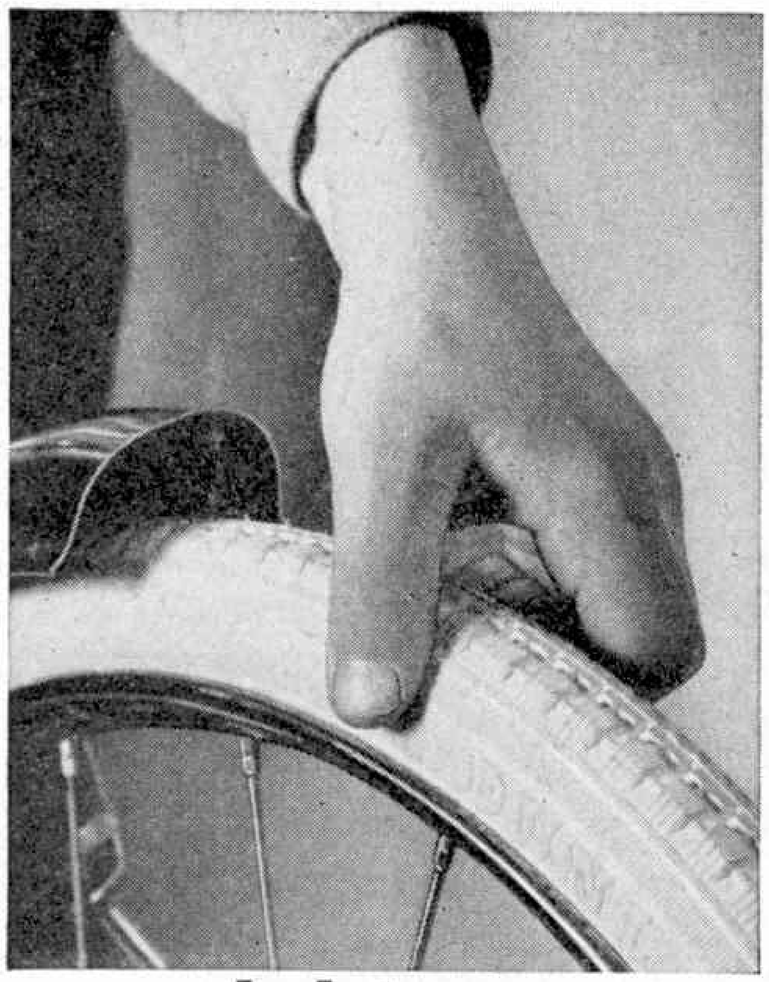
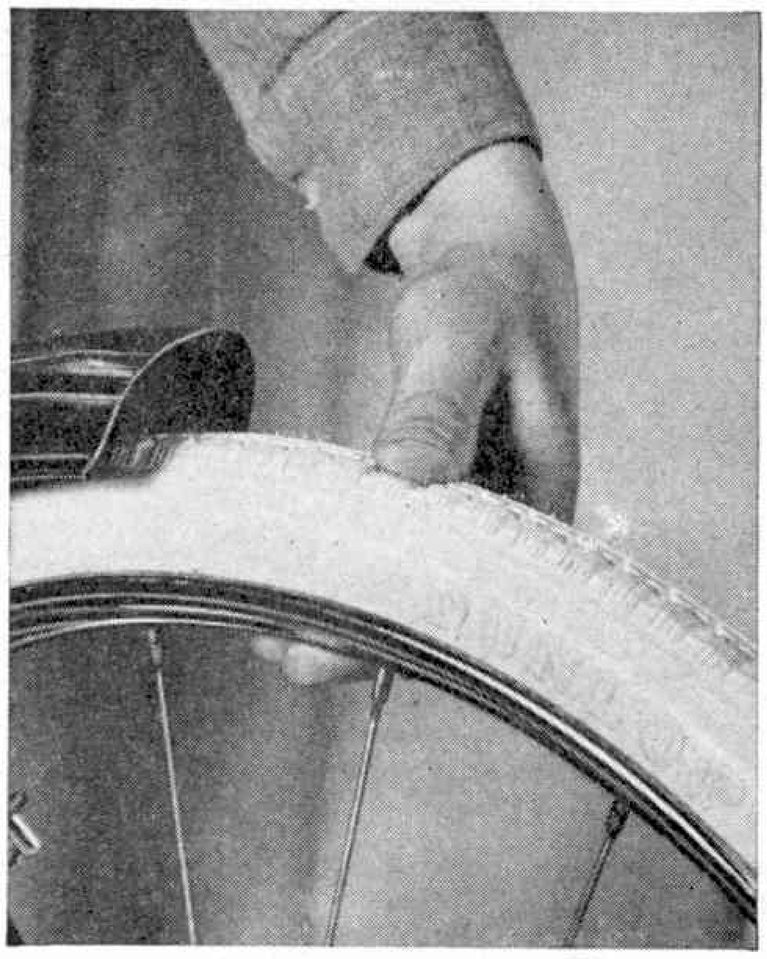


Fig. 2



right . . .



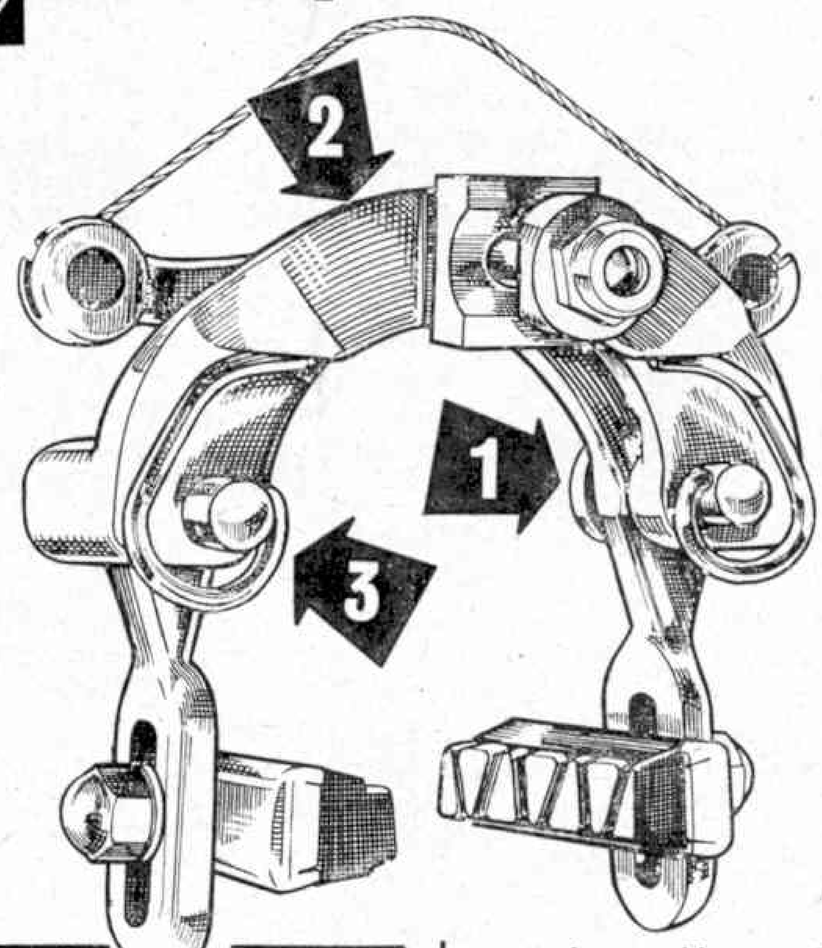
or wrong?

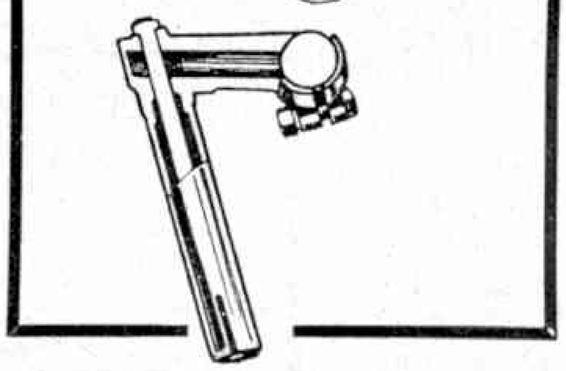
Which way do you test your tyre pressures? The correct way is to pinch the sides of the tyre between your forefinger, braced by the other fingers, and your thumb. It is incorrect to press your thumb down on top of the tread, as this will give you a false idea of the air pressure inside. If your tyre appears to be losing air too quickly, check that the valve is still intact, and turn the wheel round slowly to see there are no cuts or tacks etc., embedded in the tyre.

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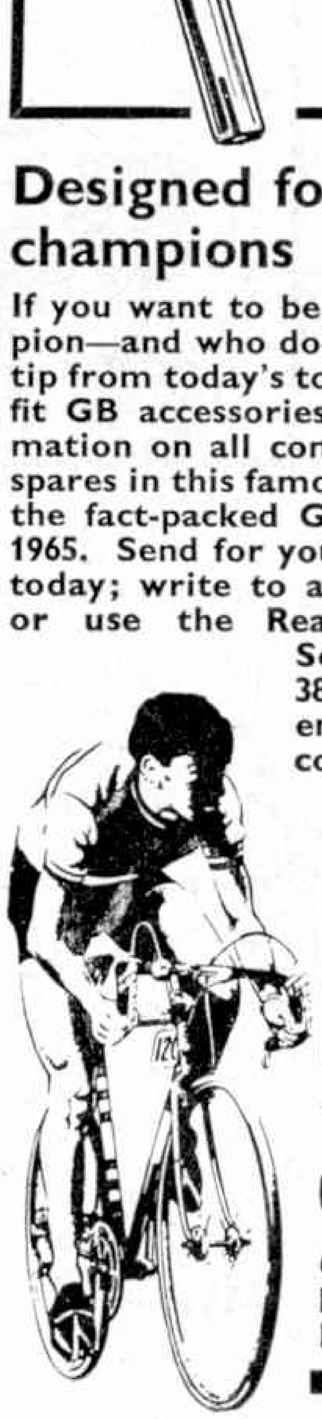
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HORNBY HOVERER HINTS

by Mike Rickett



The Hornby Hoverer being launched!

THE Hovercraft, which was developed and built in Britain, uses a unique form of propulsion and the Hornby Hoverer, a model of this now famous machine, operates by using the same principle of flight.

The Hornby Hoverer is fitted with a Babe-Bee 0·049 glow engine mounted inside the styrofoam body so that the propeller, instead of revolving in the vertical plane as on a normal aircraft, develops its thrust downwards.

When the Hoverer is in operation, air is sucked through the vanes at the top and pushed down through the bottom to form an air cushion on which the Hoverer can ride. The resulting air stream is also directed by baffles underneath the Hoverer to keep in moving forward. To allow a course to be set, a rudder is provided at the rear behind the engine.

Operating the Hoverer

When the vanes are removed from the top of the Hornby Hoverer, the control needle, which is positioned underneath on the port side of the engine, is opened a full 3¼ turns. This is easily judged by the indented mark on the needle face, which can be used as a reference point.

The Hoverer should then be turned over on its right side to bring the two fuel pipes to a position above the engine. A plastic bottle or can, fitted with a thin nozzle, can be used to squeeze fuel into the larger plastic tube or pipe which will be the uppermost of the two. Fuel should then be squeezed in until it begins to pour out of the lower tube, when the tank will be full.

When the Hoverer has been placed back in its normal position, the battery leads can be connected to the glow head by positioning the two small prongs on the clip provided. The smaller of the two prongs on the clip should slip on the circular groove at the very top of the glow head and the larger one on to the base.

Once the battery is connected, the engine will be ready for starting and it is only necessary to pour two drops of fuel through the exhaust port, below the fins on the cylinder head, to help start the engine.

If, after connecting the battery to the engine, a crackling noise is heard coming from the glow plug, it is advisable to clear the crankcase of fuel, which is probably flooding the engine. This pumping out of surplus fuel is easily done by first closing the needle and with the battery connected, turning the propeller a few times to clear the crankcase.

The glow plug, when operating normally, can be seen glowing brightly through the exhaust ports of the engine and, if this cannot be seen or alternatively only dimly, the battery will be too weak to start the engine. When you are satisfied that all is operating normally, the spring below the propeller can then be clipped on to one of the blades and the propeller revolved one full turn in a clockwise direction. Should the engine backfire when starting, clear the crankcase of surplus fuel, as described. The engine starting procedure can then be repeated.

The firing of the engine is done by revolving the propeller by the same blade to that which the spring is attached. If, after releasing it, the engine does not fire, repeat the starting operation until it does and should it still refuse to start, inject two more drops of fuel through the exhaust port.

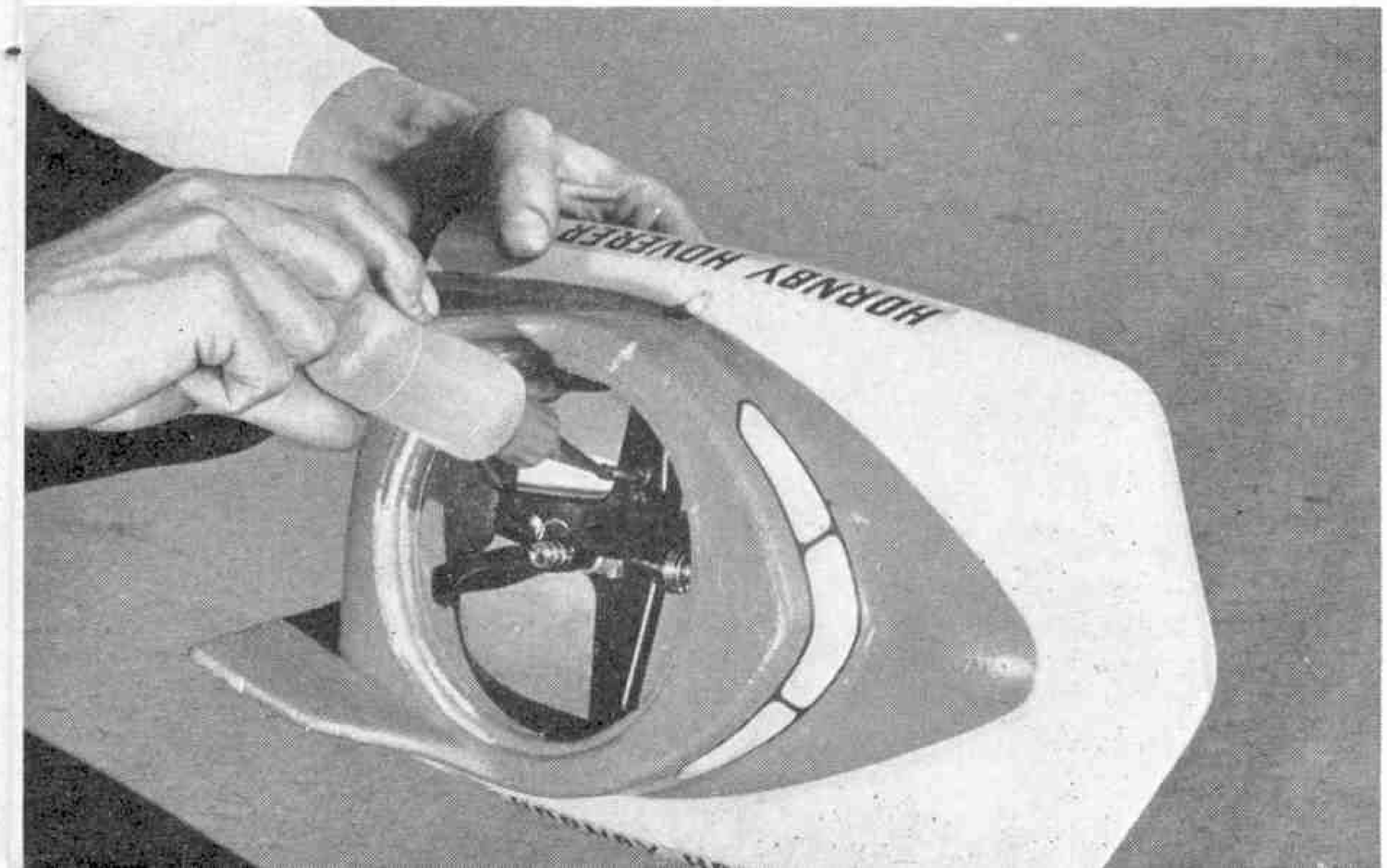
Throttle control

When the engine fires, close the control needle about a quarter of a turn, so that maximum power can be achieved. The engine will emit a high pitched note when it is operating normally and after a little practice, the sound of the engine alone will be an adequate guide. When you are satisfied that the engine is working properly, place the Hoverer on the ground, turning the rudder to port or starboard according to the course required.

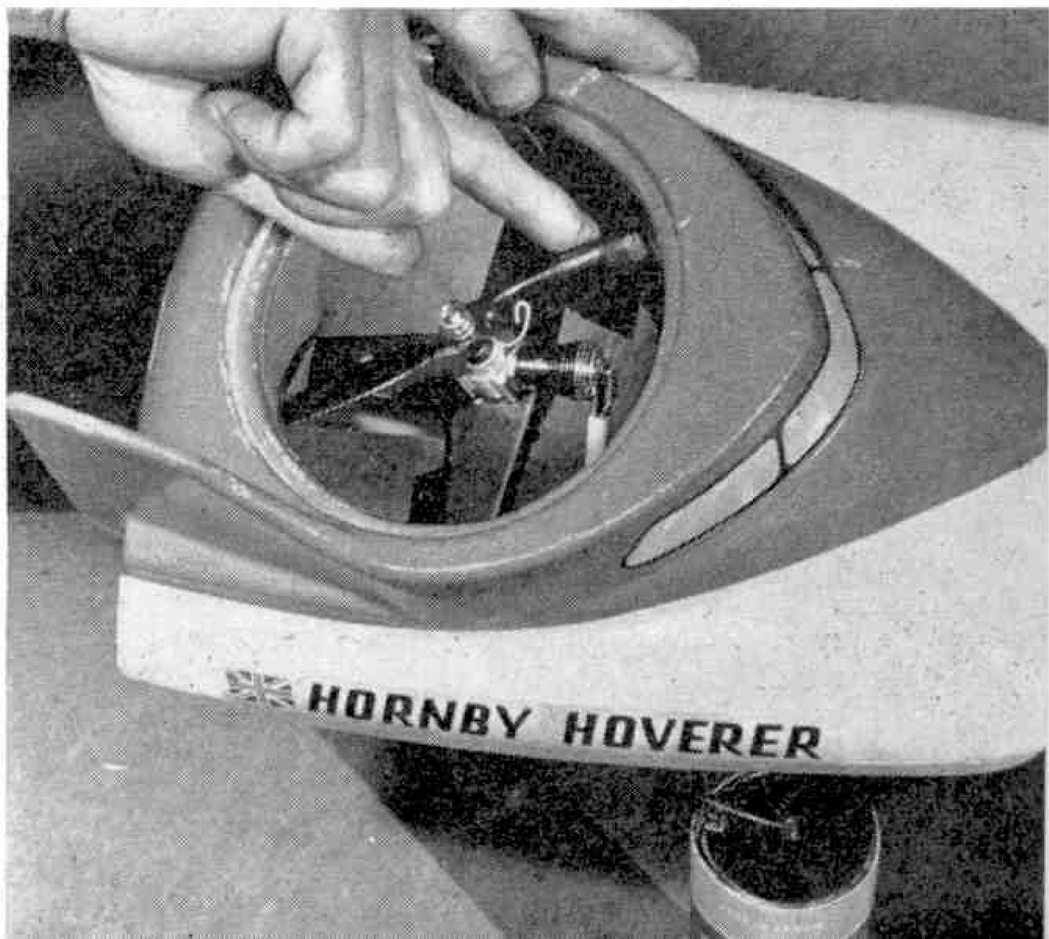
The Hoverer can also be attached to a line fixed to a post, so that it travels in a circle round the post. However, when doing this, make sure that the post or pivot is firmly embedded in the ground and also adjust the rudder so that the Hoverer steers away from the post. When operating the Hoverer in this manner, stay outside the circumference of the circle travelled by the machine.

Finally, before the Hoverer is stored away, make sure that the tank is completely empty by tilting the machine to one side until the filling pipes are below the engine. Any remaining fuel will then pour out.

Turn the Hoverer on its side to re-fuel the motor and fill tank properly



Wind one turn clockwise on starter spring for starting



The Defiant Mission



Martin Tracey makes a lone bombing raid deep into enemy-held territory!

'CART trouble!' grunted Martin Tracey, scowling at the relaxed figure of Digger Ames. Opening one lazy eye, Digger looked enquiringly up from the depths of his deck-chair. 'Wassamarrer?' he mumbled sleepily.

In spite of his annoyance, Martin grinned, for when Digger Ames awoke from a nap, he looked the most helpless, puzzled thing in creation. 'The undercarriage on the XP-12 is misbehaving,' Martin said slowly and carefully. 'It'll take at least an hour to put right, so you can go back to sleep.'

Digger grunted happily and slumped back in his chair allowing his one open eye to close again. A faint, rumbling snore indicated he had taken Martin's advice literally.

Tracey toyed with the idea of tipping the deck-chair over, then thought better of it. Instead, he found a spare chair and flopped out himself. The hot, bright sun enveloped him in a blanket of hazy warmth, the spicy smell of the grass around the edges of the runway and the faint, far-off sounds of mechanics working on an aircraft, all combined to waft him off to a delicious state of near-sleep.

A continuous shaking suddenly awoke him and he gazed, somewhat startled, into the face of an anxious young aircraftsman. 'Sir, you're wanted. The C.O. said to please report to him immediately.'

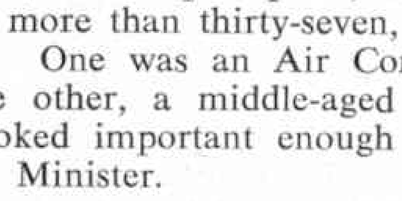
Martin heaved himself reluctantly from his deck-chair, straightened his tunic and grinned widely. 'All right, airman—at ease. Thanks for finding me. I'm on my way.'

The few minutes it took to walk to the C.O's office revived Martin from his nap and he was completely himself as he knocked on the office door and entered. The C.O., a Group Captain, whose age was no more than thirty-seven, had two visitors. One was an Air Commodore and the other, a middle-aged civilian, who looked important enough to be a Cabinet Minister.

'You—er—sent for me, sir?' Tracey asked.

The C.O. gazed at him bleakly, then turned to the Air Commodore. 'This is Squadron Leader Tracey, sir,' he said. 'I think he will be able to put up some interesting ideas for you.'

The Air Commodore stared at Tracey, then held out his hand. 'Hullo, Tracey, I've heard quite a lot about you and I think you may be able to help us solve a problem. Oh, by the way, this is Mr. Henry Wilkinson from the Ministry of Supply—he is a ballistics expert, who has special knowledge of bombs.'



The C.O. coughed to attract attention. 'Gentlemen,' he said, 'shall we make ourselves comfortable?' and with that, he drew up chairs round his desk. Mr. Wilkinson was obviously the most important man there and the other three waited for him to speak.

He was a man who went straight into his subject. 'As you know,' he said, 'the war has taken a big turn in our favour, and in the very near future, the Allies will have perfected a weapon so incredibly powerful, it will change the lives of everybody in the world.'

'The trouble is, that like any other invention at any time, we do not have a monopoly of the principle. Our agents have established that German scientists are well ahead with their own experiments and, if it had not been for the Commando raid on the Lofoten Islands heavy-water plant recently, it is quite on the cards that the enemy would have been as advanced as we.

'The Commandos put the German programme back by some months, but it seems that machinery salvaged from the Lofotens is being moved to a factory in Holland and the manufacture of the weapon can start there very soon.'

'Our only chance is to destroy the train carrying that machinery to the factory.' He stopped talking for a moment and gazed full at Martin Tracey.

'During the day, the train holes up in tunnels. It comes out only at night and travels slowly on a carefully checked route to the next tunnel. Naturally, this means its speed is very slow—something like a walking pace. But it is getting closer and closer to Holland and by this time next week, it will be *here*.' The speaker's finger stabbed at a map on the table indicating a pencilled cross near the Dutch border.

For the first time, Tracey spoke. 'I never knew there were any tunnels in Holland, sir. I thought the country was so flat, there was no need for them.'

The scientist grinned slightly. 'True,

up to a point,' he replied. 'But there are a few exceptions built by German engineers after 1940.

'A large number of rivers and dykes had to be crossed and, as bridges can be destroyed fairly easily, the Germans built tunnels at strategic points. It is one of these tunnels that the special train will stay in for a whole day. What we have to do is destroy the train!'

The scientist continued speaking. 'I've made a rather special bomb,' he said shyly. 'It's rather like the Barnes-Wallis bomb that 617 used to destroy the Mohne and Eder dams in some respects. It isn't torpedo-shaped like the usual bomb, it is really more like a rugby ball and it doesn't have the usual percussion fuse. Instead, it has a time fuse that can be set for any period from a few seconds to a couple of days.'

'In this particular application, the fuse mechanism would be set for about a minute and the fuse starts when the bomb is released. Dropped at as flat a trajectory as possible and as slowly as possible, the bomb will literally bounce on to the target, bang into it and explode when the fuse runs out.

'As always, there is the big question of delivering the bomb,' smiled the boffin at Tracey. 'Then I met the Air Commodore and he suggested trying you.'

He stopped abruptly, and Tracey caught his C.O's eye.



'The only possible way is for one aircraft, flying in low and fast, to bounce the bomb into the mouth of that tunnel and then get out—quick. What do you say, Tracey?'

Martin Tracey had been following the conversation closely and was obviously waiting to chip in. 'It should work,' he replied eagerly. 'We've had a fair bit of practice with precision bombing and we could adapt that Defiant we scrounged from the night-fighter boys.

'It's not fast enough as it stands, but if we can get one of those new Napier X engines,' he said, 'it will easily out-run an F-W190.'

The meeting immediately took on a highly technical nature. Digger Ames of the Royal Australian Air Force, also Martin Tracey's navigator, was brought in to work out routes that would, as far as possible, avoid the flak-lanes, radar coverage and fighter stations. The Engineering Officer and his staff threw themselves into the highly complicated business of changing engines in the Defiant and fitting a special swinging bomb-rack to the machine's fuselage, while Martin Tracey and Mr. Wilkinson pored over charts and diagrams to work out angles of attack.

Three days later, the uproar died down as Wing Commander Brent, the engineering officer, reported that the Defiant was ready.

Martin Tracey had insisted on leaving the flotation bags and dinghy in the machine as well as the squawk box.

'You never know,' he remarked cheerfully. 'We may have to ditch and I'm not going to bob around the Channel in a Mae West. I want a nice, comfortable dinghy to sleep in while you, Digger, can crank the squawk box to call up a Sunderland to take us home.'

Digger was only mildly amused by these sentiments. He looked up from the special chart he had been working on. 'All you have to do is drive this thing. I have to tell you where to go, keep an eye open for Jerry, take on the entire Luftwaffe by myself *and* get us back home the hard way since you've taken the radio out. If we have to ditch, I'm putting in for a transfer to the Commandos.'

Ready for the off!

Tracey grinned, for Digger Ames was in good form. The Australian straightened up and picked up his charts. 'That's that,' he announced. 'I'm all set. All we want is the final O.K. from the C.O.'

He put on the odd dark-blue tunic of the R.A.A.F. and walked across to the Operations Room with Tracey. Everything was ready. Good visibility was promised by the met. people and Intelligence confirmed that the train had arrived in the tunnel early that morning and would be there all day. The best time for the raid would be at about 16.00 hours, when the sun would be behind them and they could return across the Channel in a failing light, that would help them dodge enemy fighters.

The Defiant had been bombed up and was waiting at dispersal. Martin and Digger climbed awkwardly into the cramped confines of the aircraft and settled themselves down. The Koffman cartridge starter cracked viciously, the Napier engine spurted blue smoke and crashed into life.

Soon they were airborne! After a quick circuit of the airfield, Martin set the course which Digger had worked out.

He levelled off at a thousand feet and trimmed the Defiant for low-level flying. The ground rushed past underneath and in a few minutes they had passed over the Essex coast and were over the cold, blue English Channel. Tracey went down to about a hundred feet and held the Defiant there. In just a few minutes, they would be over the French coastline and in range of the German radar. Throttle wide open now and the aircraft bellowed its furious way over the sea. Over the slight cliffs and down the other side.

Over enemy territory

No gunfire—they were too fast for the flak gunners and it seemed likely they had flown under the radar. Tracey heard Digger Ames yelling 'Testing' and the harsh, aggressive bark of the cannon cracked above the roar of the engine. The recoil of the Oerlikon made the aircraft shudder slightly but Digger stopped firing immediately. There was no point in wasting ammunition once the gun had been tested and warmed up.

Tracey swung over the flat, depressing countryside of Northern France and flew straight up parallel with the coast and a few miles inland.

There was just one advantage about flying on the deck, reflected Tracey, as he lifted the Defiant to clear a belt of pines. You had to keep your mind on the job so much, that there was not the same tendency to relax slightly as there was at 10,000 feet.



His train of thought was suddenly interrupted by Digger's hand on his shoulder. He jabbed his fingers in the air twice and pushed a slip of paper over to Tracey. Ten minutes on a new course and that should be the target area. There was the railway—and there was the river! Already they were beating up to the target.

Tracey climbed a little and throttled back. He half-turned in his seat and attracted Digger's attention by jabbing violently downwards, but he need not have bothered. The lynx-eyed Australian had already spotted the lines.

As they worked out three days earlier, the attack was to be made at minimum speed. Tracey throttled right back and, at 120 knots, lowered his flaps and wheels. The air speed fell off to just about landing speed and the Defiant popped and banged its way down in the strange, ungraceful crab-like descent of a powerful aircraft in a half-glide. A fraction more throttle to maintain lift and there were the rails flashing past under their wheels and—there it was, the mouth of the tunnel looming up in front of them.

Bomb away!

Tracey flipped the reflector bomb-sight on and waited, hand poised over the bomb-release button, as the tunnel loomed larger and larger in the sight. A machine gun near the tunnel suddenly opened up and, even in the bright daylight, the ghostly trail of tracer could just be made out, coiling lazily towards the Defiant then, suddenly, straightening up and zipping viciously in. Half-heard tapping noises confirmed that some of the gunfire was finding its mark. Then the tunnel filled the central ring on the sight and Tracey's thumb pressed the bomb-release button.

The Defiant jerked sharply upwards as the thousand-pound deadweight fell away and a second pressure released the bomb rack. Instantly, Tracey banged the throttle hard open, hauled back on the control column and raised the flaps and wheels in one blurred movement. The Napier engine bellowed deafeningly and the nose of the aircraft strained over the top of the tunnel as the full power of

Continued on page 20

Continued from page 19
the engine dragged the Defiant over with feet to spare.

Still climbing, with the throttle pushed right through the wire to give full emergency boost, the Defiant climbed almost vertically and Tracey held it there. It was as well he did. Digger, firing enthusiastically at the machine-gunner on the ground, saw the ground erupt below them and a huge column of smoke belch skywards. The blast caught the Defiant and rocked it violently, but they were out of the immediate danger-area.

Tracey levelled off and flew back over the tunnel, with the cameras in the belly of the aircraft whirring away.

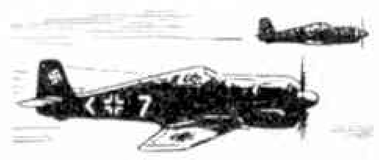
'Did you see any bits of train, Digger?' yelled Tracey. Digger shook his head and Tracey realised he had been too hopeful. The target area was largely a mashed-up welter of earth and rock.

'I think we must have got it,' Digger yelled. 'But the Intelligence blokes will have a better idea from the pictures.'

Martin Tracey nodded agreement and he swung on to the course Digger had prepared for him. Now he was flying into the sun, but it was not as bad as it had been for Digger. It was much lower on the horizon and the first streaks of evening were already showing.

'Fighters astern,' came a sudden, sharp yell from Digger. 'I can see six, eight, no . . . a dozen F-W190's. Let's get out of here!'

Tracey looked at the fuel gauges on the instrument panel and reached down for a lever under his seat. He tugged it sharply and the long-range tanks dropped away. Throttle wide open now and the Defiant surged forward. The air-speed indicator went up the scale and hovered round the 370 knot mark, then climbed again slightly. They were doing 400 m.p.h. and a delighted shout from Digger showed that this amazing speed was too much for the Germans.



Winking lights from the fronts of the enemy fighters showed their pilots were opening fire at over-long range and that settled it. The recoil of the Mauser cannon was such that the speed of the 'planes dropped by 30 m.p.h. or more and that loss enabled the Defiant to pull right away.

It did not matter about radar now, for the Luftwaffe tracking stations knew precisely where the Defiant was and also its present course.

The Defiant flashed across the coast and a savage burst of light flak showed that some gunners had their eyes, or radar, wide open. Once more, the two men were flying at minimum height over the sea, but the blue colour had faded with the setting sun and the water was now grey and cheerless. The harsh bark of the cannon broke out again. Tracey craned his neck violently round and saw half a dozen fighters peeling off in a steep dive straight for them. It looked more dangerous than it was because the Defiant was so low that the enemy pilots would have to level off before they were in the best position for firing or they would have to form up behind the Defiant and that would be a very dicey business with the deadly Oerlikon spitting at them from astern.

Tracey straightened round again, knowing full well that Digger was more than capable of handling the danger, then he stiffened with horror. Coming straight for them were six more fighters. Their Mauser cannons winked and blinked evilly as the pilots opened fire. There was a splintering crash as the shells struck and a blinding flash in Tracey's eyes as he lurched sickeningly sideways and down . . .

The bright, hot sun burned in his eyes as he struggled feebly in the wreck of the deck chair. He struggled into a sitting position and blinked at a grinning Digger Ames.

'Strewth, cobber,' drawled Digger. 'You were having a right old dream, weren't you? C'mon. They can't fix that undercart today and the job's off.'

Martin Tracey picked himself up and brushed grass seed off his shirt. 'You're right, Digger," he smiled ruefully. 'I was dreaming we were back in 1944 in the old Defiant when those F-W's jumped us . . .'

Digger laughed. 'Dream, eh?' he replied. 'Nightmare is what I would call it. Tell you what. Race you to the main block and the loser buys the beer. O.K.?'

LIST OF WINNERS IN THE MECCANO MAGAZINE ELECTRONIC KIT COMPETITION, FEBRUARY 1965

First: Jonathan Wilkson, Threebridges, Ulverston, Lancs.
Second: Peter Martin Branch, Albert Road, Ilford, Essex.
Runner-up: David Barnes, Lower Break Road, Liverpool 6, Lancs.
Runner-up: Mark Boland, Gray Road, Altrincham, Cheshire.

Ten-year-old Age Group
First: Richard Hartley, South West Avenue, Bollington, Nr. Macclesfield, Cheshire.
Second: Nicholas Jones, Cromer Road, Holt, Norfolk.
Runner-up: R. Favill, Burnett Avenue, R.A.F. Henlow, Beds.
Runner-up: Michael Hermon, Spencers Road, Maidenhead, Berks.

Eleven-year Age Group
First: Christopher Mills, Brundall, Norwich, Norfolk.
Second: Stephen Mokes, Church Avenue, Sidcup, Kent.
Runner-up: Colin Richard Johnson, Costons Avenue, Greenford, Middlesex.
Runner-up: Richard Cooper, Holyoake Road, Napperly, Nottingham, Notts.

Twelve-year Age Group
First: Rowan D. Ivery, Northfield Road, Ringwood, Hants.
Second: P. M. Moon, Junior House, Henley Road, Ipswich, Suffolk.
Runner-up: J. W. Crowther, Woodlands Road, Banghurst, Basingstoke, Hants.
Runner-up: Neil Keeton, Wellfield Close, Ridgeway, Nr. Sheffield, Yorks.

Thirteen-year Age Group
First: John Higginson, Bancroft Road, Widnes, Lancs.
Second: Alan Gardner, Swaledale Crescent, Barnwell Estate, Houghton-le-Spring, Durham.
Runner-up: Edward G. Hopkins, Green Lane, Churchdown, Gloucs.
Runner-up: R. C. Wright, Haughton Drive, Northenden, Manchester 22.

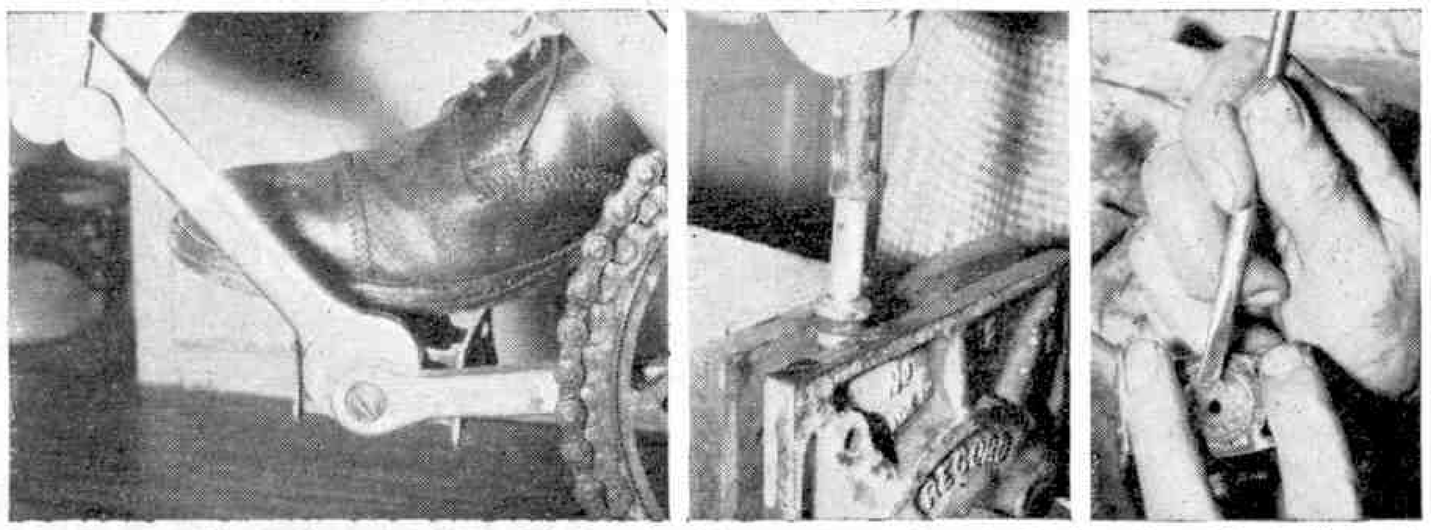
Fourteen-year Age Group
First: M. V. Thomas, Grasmere Close, Merrow, Guildford, Surrey.
Second: David Boswell, St. Marks Road, Ockerhill, Tipton, Staffs.
Runner-up: Christopher Freeman, Brampton Road, St. Albans, Herts.
Runner-up: Richard S. Aldridge, Troughbrook Road, Hollingwood, Nr. Chesterfield, Derbys.

Fifteen-year Age Group
First: Keith Winter, Merlin Crescent, Newport, Monmouthshire.
Second: Christopher Wildin, Cove Road, Aberavon, Port Talbot, Glamorganshire.
Runner-up: Michael L. Smith, Palatinate Road, Worthing, Sussex.
Runner-up: David Carr, Durham Place, Bonnyrigg, Midlothian.

Sixteen-year Age Group
First: John Melin, Otley, Keighley, Yorks.
Second: M. I. Anderson, St. Andrews Road, Felixstowe, Suffolk.
Runner-up: Stuart Russell, Danebury Avenue, Roehampton, London, S.W.15.
Runner-up: David Wendon, Quilter Green, Fordham, Colchester, Essex.

Special Prizes:
Only Girl Winner: Jennifer Webb, Yonder Wyken, Sandwich Road, Eythorne, Nr. Dover, Kent (11 years).
Most Original Entry: Howard Dunn, Jones Avenue, Larbert, Stirlingshire, Scotland (11 years).

PEDAL TIPS



Left: Keep pedal spindles tight Note right-hand unit has a reverse thread Centre: A pedal spindle can be straightened by clamping it in a vice and bending with a piece of tubing Right: Set balls in grease before refitting pedal on its spindle

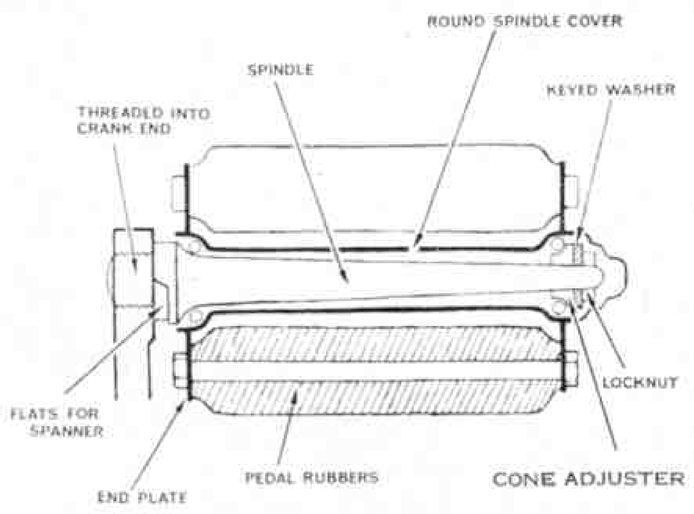
A PEDAL which twists or knocks is one of the most annoying defects a bike can have and it can certainly take all the fun out of cycling. To make things worse, pedals are the component most likely to suffer from accidental damage or from lack of maintenance. If you prop the bike up and it falls over, a bent spindle can result. Also, because the pedal is a moving component and positioned near the ground, it is easy to knock off the end cap, exposing the bearings to mud, grit and rain. Once this has happened, the pedal will be useless in a very short time.

Popular pedals

Probably the most familiar type of pedal is the one shown below. It is fitted with rubber bars as a grip for the rider's feet. The other type, fitted mostly to sporting cycles, is the steel rat-trap pedal. This works on exactly the same principle.

The pedals fix into the crank by screwing the threaded end portion into a threaded hole in the crank. The right-hand pedal and crank have a left-hand thread, but the left-hand pedal has a right-hand thread.

Two bearings are incorporated. One ball track is on one shoulder of the spindle and the other is on an adjustable cone, which screws along a threaded portion at the other end.



Pedal construction is basically the same for all various models

Facilities are usually provided for lubricating a pedal, but these are seldom completely satisfactory. The bearings at the crank end of the pedal are very often starved of oil. The best scheme is to take the pedal apart periodically, inspect the races for wear, clean them and replace with new grease. If only cleaning is planned, it is a matter of personal choice whether the pedal is removed from the crank or not. However, if a bent spindle is suspected and this will make itself obvious by a nasty twisting motion under your foot, the pedal must be taken off for straightening.

Dismantling is simple. Start by taking off the end cap—this may be a push fit, but usually it screws off. Underneath it will be found a small nut. Hold the other end of the pedal with a spanner and unscrew this. A keyed washer comes off next and under this will be found the cone adjuster.

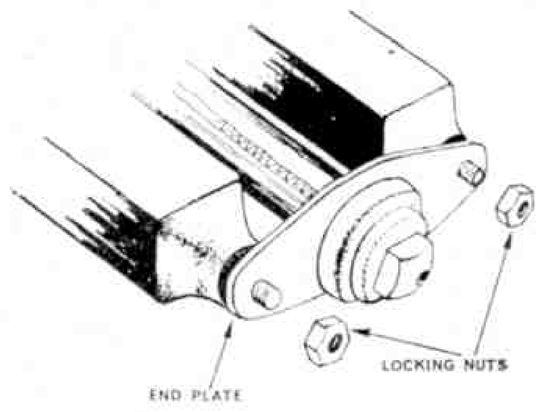
Cleaning the units

A small screwdriver in the slotted face of this will soon get it unscrewed. Now the spindle may be taken out, making sure you do this over a piece of clean rag, in order to catch the balls as they fall out of the races.

Clean all the balls, the spindle, the cone adjuster and the pedal frame in paraffin and look for wear. This will show as pitting on the ball tracks or on the balls themselves. Renew any parts that are worn.

Before reassembling, it may be necessary to straighten a bent spindle and this should be done using the set-up illustrated above. What cannot be seen in this photograph is that the cone adjuster has been replaced on the top of the spindle to protect the thread. The best idea is to mount the pedal spindle in an old crank and clamp the crank in the vice. Then, as the bend is gradually pulled out of the spindle with the tube, the spindle can be rotated to and fro in the crank until it can be seen that it is no longer bent. This will be when the spindle tip no longer describes a circular path.

With rat-trap pedals, it will be found an ideal opportunity, while the pedal is dismantled, to tighten up any loose plates. These are usually riveted and the idea is to support the plate on the inside and hammer the burred end of the rivet, until the plate is tight once again.



On rubber pedals: you can renew the rubbers when they are worn

Reassembly is straightforward. Position the balls in the cups in the end of the pedal frame, making sure they are of the right size (usually $\frac{1}{8}$ in. or $\frac{5}{32}$ in.) and of the right number. Remember there should always be a space just about the width of one ball. Use clean fresh grease. Tighten the cone until there is no play left but the pedal turns without friction and then lock with the washer and nut.

Another common fault with rubber pedals is that the locking nuts on the ends of the rubbers are often lost. Always replace them at the first opportunity. Otherwise the pedal loses rigidity and soon distorts.

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CAMERA



Here's a camera that's as reliable as a full-back and as sharp as a winger. It's been specially designed by Kodak to take snaps in full colour and black-and-white—and it costs only 29/1d. It's easy to use, and its new formula plastic body fits perfectly in your hand. Takes perfect snaps. A winner of a camera at a practical price.



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SUMMER PHOTO

MAKE GOOD PICTURES



SECTION



Professional photographer, Paul Dong, shows how your camera works and gives a guide to developing and printing your own films and photographs . . .

What is a Camera?

BASICALLY, a camera is a light-tight box with provision for holding a piece of film flat at one end and a lens at the other (Fig. 1). The lens is equipped with two controls for admitting the required amount of light.

The aperture is a hole, the size of which can sometimes be adjusted to control the strength of the light admitted, whilst the shutter controls the length of time that the light is allowed to fall on the film.

A viewfinder is placed on the top to enable us to judge which way the camera is pointed and, in more advanced cameras, there is often a means of moving the lens backwards and forwards to focus on objects at varying distances.

Types of camera

The single lens reflex (Fig. 2) is a camera which uses the taking lens for viewing. This is achieved by placing a mirror inside at an angle to reflect the image of the lens on to a ground glass screen, making it easier to focus and frame the picture.

If the shutter were placed on the front of the camera, this would need opening to view and the closing before the picture is taken, a complicated procedure. Therefore, the shutter is placed behind the mirror and just in front of the film. Thus, when the button is pressed, the mirror pops up out of the way and the shutter then operates.

With the aperture closed down to its normal working position, the strength of light passed is rather weak. However, this can be cured by opening it up to give a bright image for viewing, although it has to be closed down again just before taking the photograph. Modern S.L.R. cameras are fitted with an automatic means of doing this.

The advantage of the S.L.R. is easy focusing and a shutter which is capable of much higher speeds than the normal 'between lens' type. The main drawback is the subject disappears from view as the button is pressed and the mirror pops up. The single lens reflex camera is relatively costly as the shutter is more expensive than the between lens type.

The twin lens reflex (Fig. 3) combines a reflex viewing system with a basic type of camera underneath. The two lenses are fitted on a common focusing panel, so that when the image is sharp on the top, it is the same for the 'camera' underneath. By using this system, the loss of picture when taking the photograph is avoided as the mirror does not need to move.

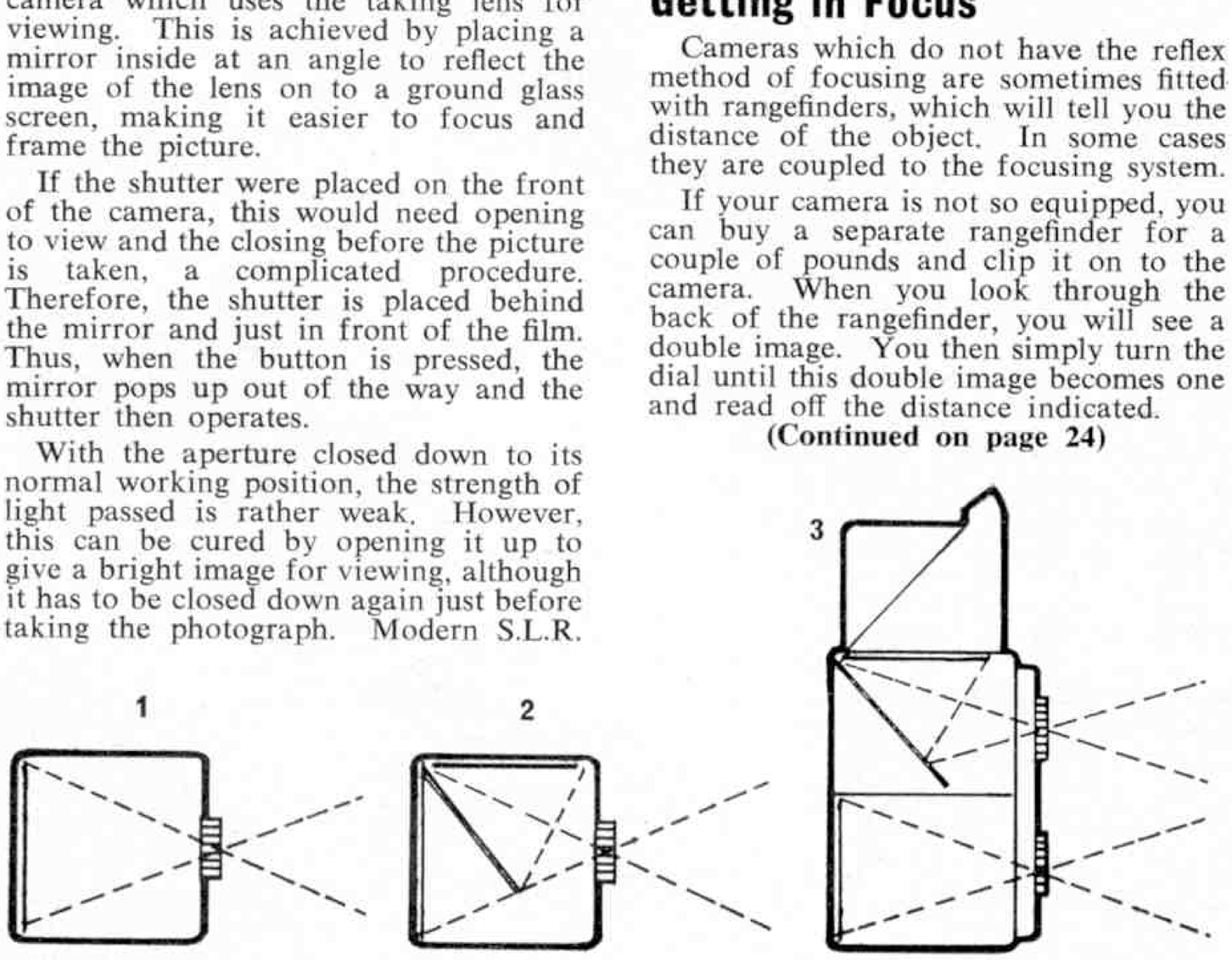
The taking lens is always at full aperture, avoiding the need to close it down when taking the photograph. This type of camera uses the between lens shutter, which means that the maximum shutter speed available is about half that of the S.L.R. The lenses on twin reflexes are not normally interchangeable (the Japanese Mamyaflex is the only one with interchangeable lenses at the moment) and if you want to use close-up lenses on this type of camera, you have to buy a matched pair, one for each lens.

Getting in Focus

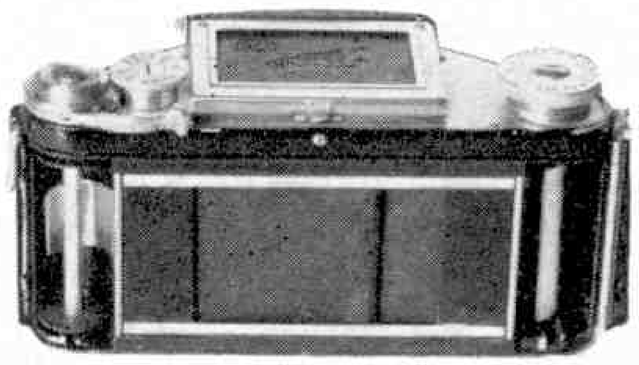
Cameras which do not have the reflex method of focusing are sometimes fitted with rangefinders, which will tell you the distance of the object. In some cases they are coupled to the focusing system.

If your camera is not so equipped, you can buy a separate rangefinder for a couple of pounds and clip it on to the camera. When you look through the back of the rangefinder, you will see a double image. You then simply turn the dial until this double image becomes one and read off the distance indicated.

(Continued on page 24)



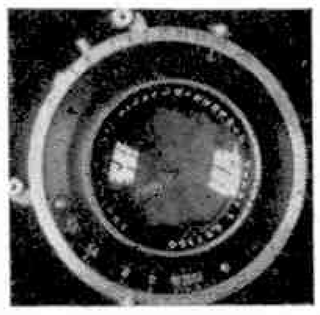
If your camera isn't fitted with a rangefinder, a unit similar to this may be purchased and clipped to the top of the camera to work out the distance from the subject



The back of this single reflex camera is open and shows the focal plane shutter. In this case, as in many others, it is made of special cloth. The shutter speed is controlled by the width of the slot in the blind and the speed with which it crosses the film.
This type of shutter is capable of speeds up to 1/1000th sec. Bulb and electronic flash can only be used at the lower speeds around 1/25th, when the slot is wide enough to cover the whole negative area.
The shutter speeds are marked on the knobs on top. If you own this type of camera, it should not be left lying in the sun. The reason? The lens focuses the sun's rays on the blind, in the same way as a magnifying glass, and it will soon burn a hole in the shutter and ruin the camera.



A typical twin lens reflex camera, the Halina has the two lenses linked together for focusing. Other types of T.L.R. have the two lenses mounted together on a panel which can be moved backwards and forwards.



Cameras with between lens shutters have the shutter speeds marked around the outside, with a small pointer for setting the speed required. Note that with all shutters you must set directly on to the speed required. You cannot set between 1/50th and 1/100th and get a speed of 1/75th, you will only wreck the shutter. Top speed available on this type of shutter is normally 1/500th.
Apertures can however be split like this for finer control of exposure. This one is set between f8 and f11 giving an aperture of approx. f9.5.

SUMMER PHOTO SECTION

FILMS AND EXPOSURES

THERE are three types of film in use today, 35 mm., roll film and the new Instamatic cartridge. This is, of course, apart from the plates used by professional photographers.

The 35 mm. film is used in a cassette, which normally has a light trap made of velvet where the film enters. A minority have a shutter system, which is opened and closed by the locking screw of the camera.

This film is completely unprotected apart from the cassette, which is placed into the camera, after attaching the end to the take up spool. Therefore, you must close the back of the camera before winding on. After exposure the film must be rewound into the cassette before the back of the camera is opened.

The size of the negative from 35 mm. cameras is normally $1 \times 1\frac{1}{2}$ inches, although some cameras do take slightly smaller pictures. If your camera takes this size, you will need to enlarge all of your prints. Most single lens reflex cameras use 35 mm. film.

Roll film is used for most of the twin lens reflex cameras and many box and folding cameras. The film itself is attached to a length of backing paper which you hook into the take up spool. When the film has been exposed, you remove it, complete with spool, and put the old spool into the take up side of the camera.

The most popular size these days is 120 or 620 film. Each gives the same size pictures, but the spool the film is wrapped around is slightly different, the 620 being smaller. Some cameras take both sizes, but the modern cameras take only one. Make sure you buy the correct film, as many smaller chemists and shops that sell film will try to sell you 620.

Instamatic cartridges are intended for the very popular range of Kodak Instamatic cameras. All you do is open the camera, drop in the cartridge, close the back and the camera is loaded.

Exposure

There are many types of film on the market, with varying speeds, which are expressed as numbers. There are also several different systems of numbering, as there are different methods of recording temperature, i.e. Centigrade and Fahrenheit.

The two most popular speed rating systems are A.S.A. and B.S., but whichever system you decide to use must depend on your method of determining exposures. Fortunately most film manufacturers give the speed of their films in several systems to save you converting.

There are two controls on the camera which allow the correct amount of light on to the film. The first is the shutter, which of course controls the length of time the light is allowed to pass. The other is the aperture, usually called the stop or 'f' number. The lower the 'f' number, the greater the strength of the light that is passed.

Both the shutter speeds and the aperture settings are in equal stages, each step up being half that of the preceding step. The first problem in exposing the film is finding out what combination of these two figures is needed. The settings of the box camera are somewhat limited, usually 1/50th second at f11 with another aperture, f8, for use in poor lighting conditions.

However, as you progress in photography, you will realise how much of a limitation this is, precisely the reason why you can only get good results with this type of camera in good weather.

The leaflet packed with the film is quite a good guide for average weather conditions, but it does not take account of the fact that a subject in slight shade is receiving less of the sun than another in full sunlight, or that a person in a black suit against a dark background will need very slightly more exposure than a girl in a light dress against a light background.

It is therefore obvious that something better is needed, especially for the wide range of subjects and weather conditions that could not possibly be put on the little piece of paper packed with the film.

Using a Calculator

The exposure calculator (Fig. 1) which costs five shillings, is a very good piece of equipment for the beginner. It is used in a similar way to the telephone; in other words, you set two black arrows together at the start and then dial the weather, subject, speed of film and time of day and year. The exposures can then be read off in the window.

As you can see, you get a range of exposures, but as each step moved on one scale equals one step on the other, they are all giving the same result on the film. All you have to do is choose which pair of numbers you are going to use. If you are going to take a photograph of an average subject with little or no movement you use one in the middle.

If your subject is moving at a fairly high speed, you will need a high shutter speed to prevent it being a blurr on the negative. If, on the other hand, your subject is a view along a street, you need plenty of depth of field to keep all in the photograph sharp, so you use a small aperture.

Using a Meter

The exposure meter (Fig. 2) is much more expensive than the calculator, costing from four pounds upwards. Generally speaking, the more they cost new the better they are, but there may be exceptions to the rule. The best buy of the lot is the Weston meter, which will cost around ten pounds. There are large numbers of the other makes sold, but some are not really adequate.

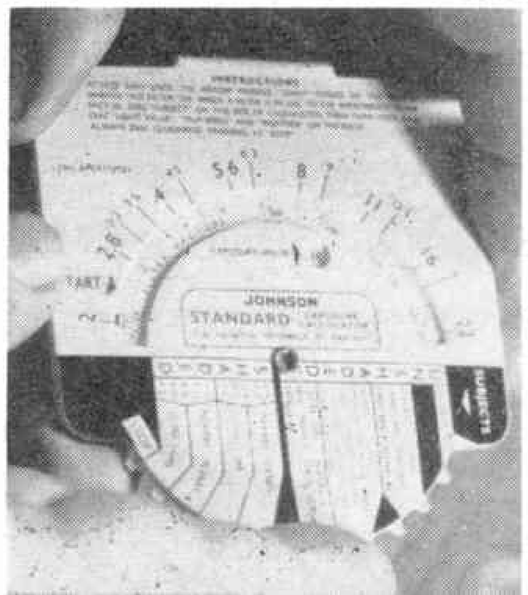
The meter is used by pointing it at the subject. The needle will then move up to record the strength of the light. The figure given on the large scale is then set on the dial and the possible exposures are read from the dial. Many meters have a special piece of white plastic which can be placed over the window where the light enters. This allows you to point the meter direct at the light source and take the reading from this. It is useful where you cannot actually get near the subject and in a host of other conditions too lengthy to mention here, but all to be found in the instruction leaflet with the meter.

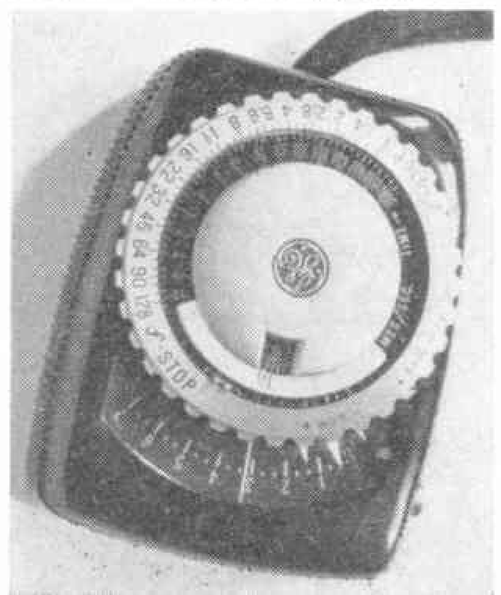
If you are using a meter without the plastic attachment (called incident light filter) and are pointing the meter at the subject outdoors, point it slightly downwards, or you will pick up a false reading from the sky, which is extremely bright.

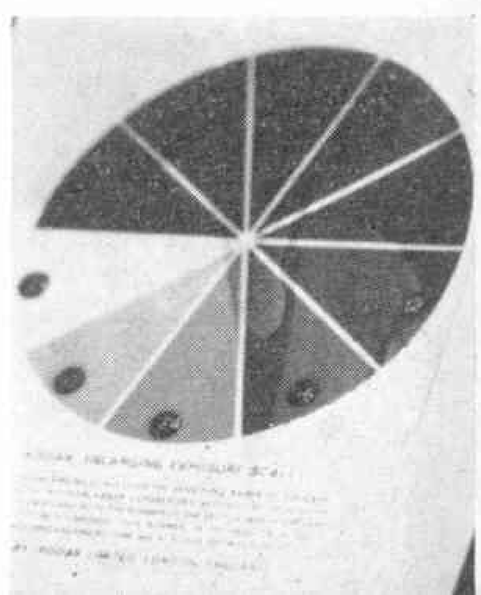
Darkroom exposure

Exposure meters for enlargers cost a small fortune, but an enlarging exposure guide from Kodak (Fig. 3) costs only a few shillings. You set up the enlarger with a sheet of paper in position and lay the guide on top. Expose for one minute through the guide and, as usual, develop the paper for two minutes. The guide will provide you with various densities of print, all numbered, and this number is the exposure required to get that particular effect. All you have to do is decide which section is the correct one and the correct exposure is marked.

Left: A Johnson Exposure Calculator. Centre: A Light Meter, used to obtain an exact exposure reading. Right: A Kodak enlarger exposure guide.

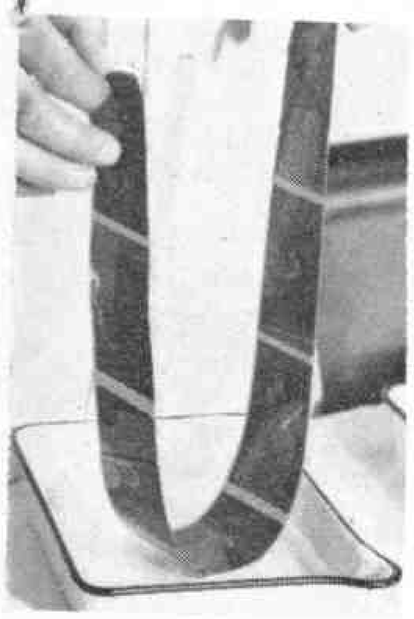






SUMMER PHOTO SECTION

HOW TO DEVELOP FILMS



There are three stages in the production of the negative after the film has been exposed — development, fixing and washing. For cheapness, this work can be done with the minimum of equipment by using three dishes, see-sawing the film through the solutions all the time to ensure that the chemicals are evenly spread. The main objection to this type of working is that the film must be kept in the dark until it has been fixed, so you will spend some 15-20 minutes in complete darkness with someone outside telling you the time.

For ease of working, we normally use a developing tank which enables us to turn on the light as soon as the film has been loaded, but the processing is similar to using dishes.

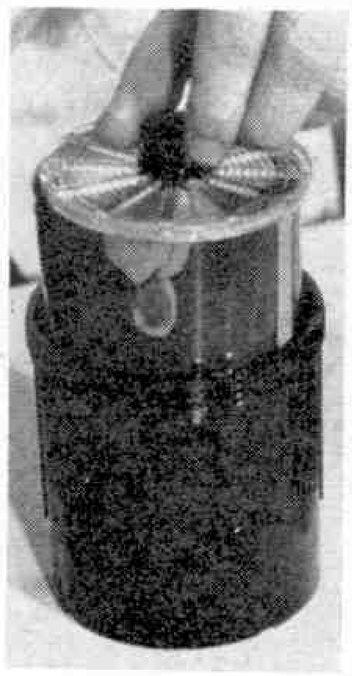
The most important part of using a developing tank is loading the film into the spiral; this has to be done in the dark and it takes a few attempts to acquire the knack of doing it easily. If you have an old film which you do not want, it can be used to practise with the light on before you try with your best film. The spiral unit has a groove in the top and bottom which starts at the outside and works into the centre, like a gramophone record, with one going the opposite way to the other. By putting the film in at the starting point on the outside and gently pushing, you will find that the film will work its way in towards the centre and will be held securely enough during processing. A Universal tank, costing around 35s. 0d., is adjustable to take all normal film sizes.

When loading 35mm film, first cut off the tapered portion of film at the beginning used to load the film into the camera and keep the scissors handy. When you get to the end of the film, you will find it attached to the spool in the cassette and you will have to cut the film off. When loading roll film, unroll the backing paper slowly, until you feel the end of the film which is to be put into the spiral. At the far end of the film, you will find a piece of sticky tape fixing it to the paper; tear this and throw the backing paper and spool on to the floor as this is now waste. If you try to be neat and tidy and roll up the paper again in the dark you will probably make the fatal mistake of dropping the spiral

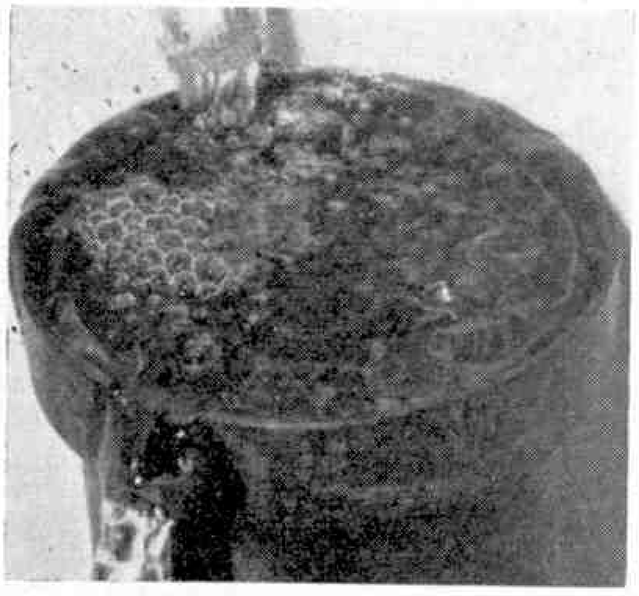
Next place the spiral into the tank body the right way up and replace the lid. After making sure that the lid is on correctly you can turn on the light and carry out all the processing with the light on. This is the advantage of the tank—if you use developing dishes you will have to stay in the dark.

Having made sure that the developer is at the correct temperature, pour it into the top of the tank. Then agitate the developer in the tank to clear all the air bubbles that may be trapped on the film and ensure that the developer reaches the film. This agitation should be carried out for 10 seconds during every minute of development, to ensure even circulation of the developer. The correct temperature is 68°F (20°C); a thermometer costs around 5s. 0d. and the time that the film should be left in the developer will be found on the instruction sheet for the particular developer you use.

When the development time is complete, pour the developer back into the bottle it came from, WITHOUT taking the lid off the tank. Next pour in the same amount of water, again at around 68°F, and give the spiral a slight agitation with the stick. This water is immediately poured down the sink and replaced with the fixer, again at 68°F, and the spiral agitated.



After about ten minutes you can take the lid off the tank, or if you are developing in dishes, turn on the light, and have a look at the film. You will then see the familiar negative, which should be black on clear film. However, the film may have a creamy appearance, which means that it is not completely fixed, in which case it must be put back in the fixer until it is clear.



When the film has cleared, leave it in the fixer for another five minutes, and then place the tank under running water for twenty minutes to wash the film thoroughly. The fixer can be retained for further use. After this the film should be hung up in a dust free place to dry.

If you take the film straight out of the water and hang it up, you may find that drops of water form on it as it dries and that these will leave marks on the film when they eventually dry out. This can be avoided by giving it a final rinse in water containing a couple of drops of Wetting Agent, or by wiping it down carefully with a film wiper.

Requirements for Developing

Developing Tank (Universal)	**35/–**
or	
3 dishes—small	**7/6**
Thermometer	**5/–**
Measure	**10/–**
Funnel for pouring chemicals back into bottle	**2/6**
Wetting agent	**3/6**
or	
Film wiper	**14/9**
Developer	**3/9**
Fixer	**3/–**
Clock or watch for timing	**—**
Clothes pegs	**—**

Developer

There are many developers on the market, most of which are suitable for any film. For the beginner, either Johnsons Unitol, which is purchased as liquid, diluted as required, then used once and thrown away, or Kodak D76, purchased as powder and made up before use, are suitable. The latter is kept after use and is suitable for developing up to six films before it is thrown away. Most developers on the market will cost about 3s. 6d. for enough to develop six films.

It is wise to note that the high-speed films, Kodak Royal X pan and Ilford H.P.S., must be developed in special developers. So, if in doubt, look on the instruction leaflet packed with the film.

Fixer

There are many fixing solutions on the market suitable for normal photographic use, one of which is Kodak Unifix. When made up the solution will fix a large number of films, before it is exhausted. When the fixer takes more than 15 minutes to clear the film it should be discarded.

Recommended books for the beginner:—
All in One Camera Book by W. D. Emmanuel Focal Press 10/6
Photoguides available on all individual aspects of photography Focal Press 2/6
All your own work, developing and printing at Home Kodak 2/6

(continued on page 27)

DO'S and DON'TS

DO's

Make sure that the temperature of your solutions is correct, as drops in temperature mean longer processing times and until you have had considerable experience, it is not easy to calculate what increase is necessary. Remember that with developers able to process several films before becoming exhausted, you need to increase the development time slightly for each successive film. You will find the amount, usually 10% in the instruction leaflet.

Finally, read the instruction leaflet before you start.

DON'Ts

Never mix up the solutions, bottles or stoppers! The fixer is designed to stop the action of the developer and fix the film. Brown bottles should be used for storing developers.

Don't put solutions on the gas or electric stove to warm them up; they will get too hot at the bottom and decompose. To heat solutions stand the bottle in warm water, not hot or you will break the bottle. Solutions also have chemical action on saucepans.

Don't touch the emulsion of the film more than necessary, particularly when loading the tank, especially if your hands are wet.

Never allow the fixer to get near the film before development.

Don't kink the film when loading the tank.

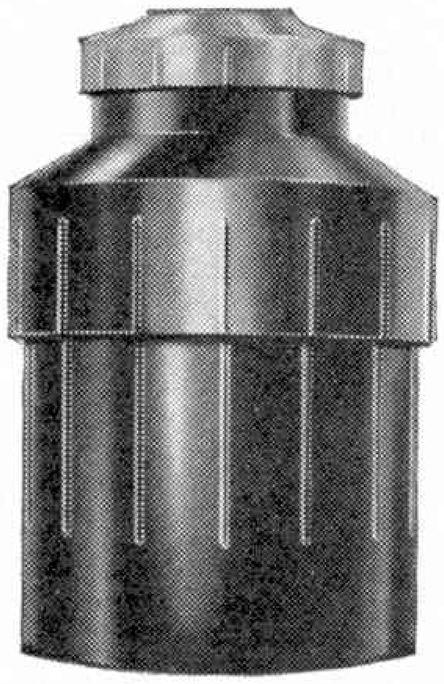
Finally, never try to load a film into a wet spiral; it will stick. Also, don't try drying the spiral by excess heat; being plastic it will warp.

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The Ilford Sprite 35 makes you a photographer straight off. And gives you a load of fun. It's all so easy. Load with Ilford FP3 and there you are—great black and white shots. Test your skill on Ilford Colorprint or Colorslide and before you can say 'birdie' you've got colour prints or colour slides to be proud of. And 'flash' pictures too with the special Sprite flashgun priced at only 18/6d. With its three simple settings the Sprite 35 will give you pictures as good as cameras costing a whole lot more. Yet the Sprite 35 is only 57/6d. (Ever-ready Case 10/6d.)
Take your Dad to see the Sprite 35 at your nearest Ilford shop. You could even let him borrow it—if he's good.

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JOHNSON UNIVERSAL DEVELOPING TANK

(designed by practical photographers to do a better job)

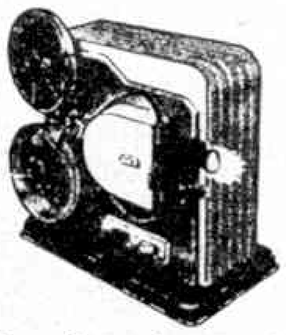
1. easy to load with roto feed device. 2. large filling funnel. 3. takes 4 sizes of film—120/620, 127, 35 and 16 mm; takes two at a time of 120 or 127. 4. lid easy to replace in dark. 5. empties easily, cleanly and rapidly. 6. leak-proof with screw-on lid. 7. ribbed to prevent slipping in wet hands. 8. novel system of light trapping eliminates "spluttering". 9. design based on years of experience and manufacture. 10. made in black polystyrene. 32/6 at your stockist.

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This projector is a **must** for all at a price that cannot be equalled.
Supplied with 1 spare bulb and 6 leak proof batteries at the phenomenally low price of **£6.0.0**

- It is perfectly safe to use, even for children
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- Fast rewind.
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SUMMER PHOTO SECTION

Producing Your Prints

A PRINT is made by passing light through the negative on to a piece of sensitive paper, which is then developed in a similar way to the film. The main difference in the processing being that you can see what is happening and the developer used only takes two minutes to work.

Contact printing is the simplest and for this you require a contact printing frame, three dishes, thermometer and contact printing paper, such as Kodak Velox paper. The main limitation of this process is that you can only produce prints the same size as the negative.

Your equipment should be laid out as shown in the diagram, so that direct light from the lamp does not fall on the dishes or paper. Daylight should be excluded from the room by heavy curtains.

First, take your contact printing frame and make sure that the glass is thoroughly clean. Dust and dirt will give you white spots on the print. Next, clean the negative by dusting lightly. Now, place the frame so that it is shaded from the light.

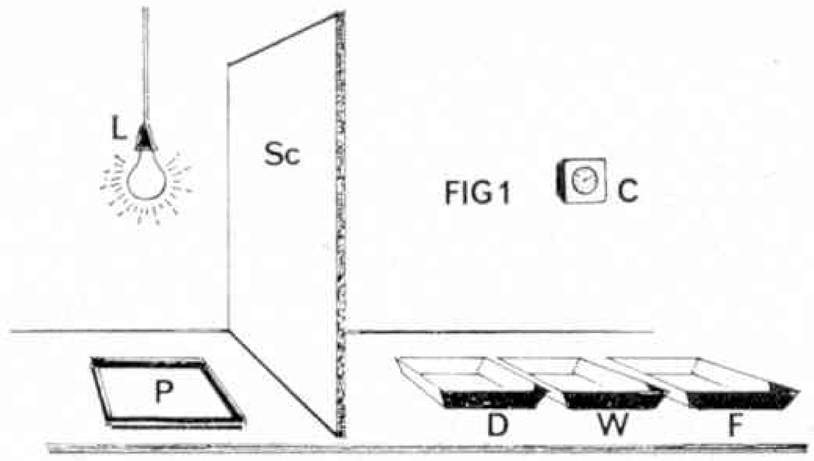


FIG 1 C

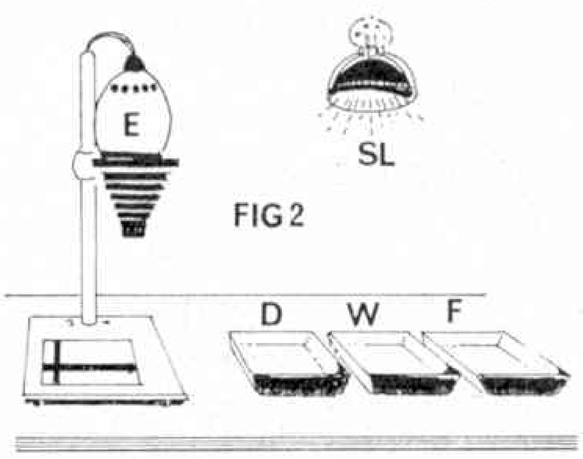


FIG 2

Fig. 1 : A contact printing layout showing light, screen, printing frame, plus clock and three chemical dishes in the shade.

Fig. 2 : Enlarger layout showing enlarger, safelight and three chemical dishes for developer, water and fixer.

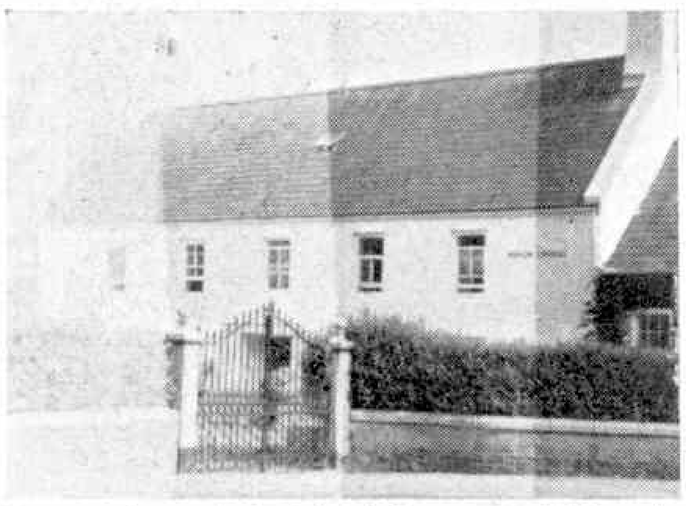
The negative is then positioned in the frame emulsion side towards the back, the emulsion side is the dull side and the print paper is placed with the emulsion (in this case the shiny side) against the emulsion of the negative. The back can then be put on to the frame and clipped into position.

The frame is turned face up and placed about 18 inches away from the light, which is allowed to shine on the front for about eight seconds. Having exposed the paper in this way through the negative, take the frame back behind the partition and remove the paper.

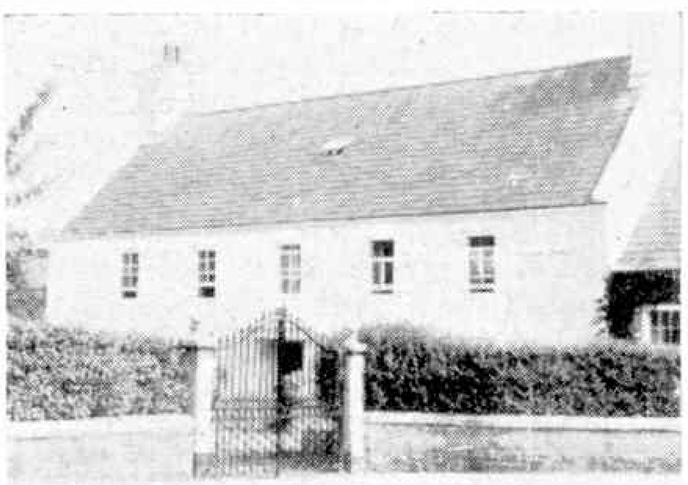
Place the paper in the developer and keep it moving slightly for the two minutes' development time. D163 developer is recommended for this paper. After the two minutes in the developer at 68°F., remove the paper, give it a quick rinse in the second dish and then put it into the fixer. After a couple of minutes, you can put a strong light on it and see your photograph. If the print is too light, it means that it hasn't had long enough exposure, and too dark means too much. Make another print altering the exposure time accordingly.

If your camera takes $2\frac{1}{2}$ by $3\frac{1}{2}$ inch negatives and your printing frame is that size, you should get a nice white border on the prints. But, if your negative is not the size of the frame, you will need to buy a packet of assorted masks. The appropriate mask is placed in the frame before the negative to give the correct border.

After fixing for ten to fifteen minutes (the fixer used for the film is suitable), wash the prints in running water for twenty minutes and dry by one of the explained methods.

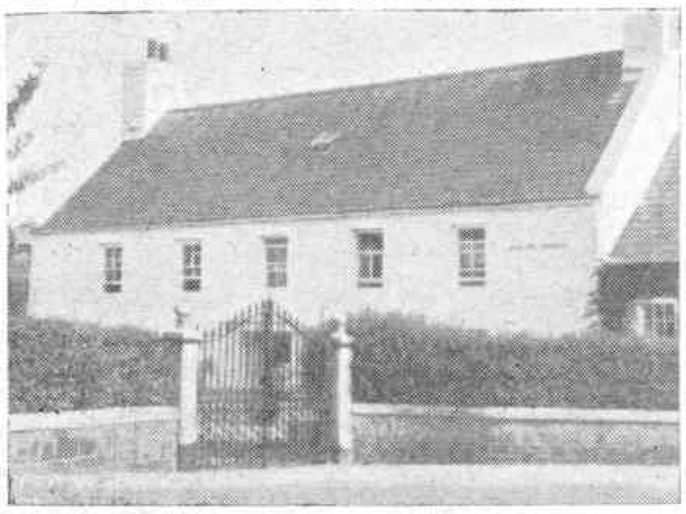


By exposing a test strip at five second intervals, one can gauge the correct exposure for a particular negative. A test strip is shown above to illustrate point.



Above : Hard paper = soot and whitewash!

Below : Soft paper = very little contrast.



Enlarging

In order to make enlargements, you need more elaborate and consequently more expensive equipment, which consists of an enlarger and a safelight. The paper used is called bromide paper, which is more sensitive to white light than the paper used for contact printing. Therefore, it must be used in a darkroom, together with a safelight. The cheapest safelight is a coloured bulb, costing five or six shillings. You can get the correct colour from your photo shop.

The main point to remember in order to get the best out of your enlarger is to buy a lens of the correct focal length for the negatives you intend to print. If you have a 35 mm camera with a universal enlarger and lens for 35 mm, you only have to change the lens when you buy a bigger camera.

After cleaning any dust from the negative, it is placed in the negative carrier, emulsion side downwards. The masking frame is then set to the size required and the head of the enlarger moved up or down to give the degree of enlargement required in the space set on the masking frame. The aperture in the lens of the enlarger should be fully open and the enlarger light on!

Correct exposure

When the picture has been set and correctly focused, the aperture ring should be turned one or two marks or stops. This has two effects: one, it cuts down the strength of the light, increasing the exposure required to a reasonable length to control and two, the depth of focus is increased, making up for any slight inaccuracies in focusing the enlarger.

The bromide paper is placed in the masking frame and a test print made as explained in the illustration, after which the print is developed in the same manner as the contact print. The developer recommended, D163, is suitable for this paper also, except that the strength is different. Full details are included in the leaflet packed in the developer.

To start with you should buy the normal grade of paper either in Velox for contact printing or bromide for enlarging. There are other grades and these are used as follows. If your print is soft, that is very little contrast between light and dark, you should use a hard paper. If the print is very contrasty, i.e. soot and whitewash effect, you should use soft paper. But it is best to get used to normal paper before you start using the others.

After your prints have been washed, you have a choice of drying methods. The cheapest is to lay them face upwards on clean blotting paper overnight. The other method is to buy an electric dryer for a few pounds, which will dry them in five to six minutes.

Requirements for Printing

Contact printing:	Frame by Rowi, $2\frac{1}{2} \times 3\frac{1}{2}$, 8s. 0d.
	Dishes $3\frac{1}{2} \times 4\frac{1}{2}$, 7s. 0d.
	Forceps, 3s. 6d.
	Masks.
Enlarging:	Enlarger, £14 upwards.
	Masking frame, £3 upwards.
	Higher quality Lens, £7 upwards.
	Dishes, 3s. 6d. upwards, according to size.
	Safelight, 30s. 0d. upwards.
	Electric Dryer, £2 5s. upwards.
	Glazing Sheet, 8s. 0d. upwards.



build your own flying model helicopter from this design by Ray Malmström

the "ascenda"

MODEL helicopters are fascinating, unusual flying machines and it is strange that so few designs, particularly rubber-powered ones, are available to aeromodellers. Therefore, this month, Meccano Magazine presents especially for you, a new helicopter design, the Ascenda. Watching Ascenda fly vertically upwards, hover at a good height and then descend slowly as the power runs out, is a new kind of model flying that no other model aircraft can provide.

Although not a beginner's model, if you have a little aeromodelling experience, you should not find Ascenda difficult to construct and fly. Start construction with the rotor unit. Cut out the rotor head from $\frac{1}{16}$ inch plywood and drill the centre hole to take a 20 s.w.g. wire shaft. Bend three wire rotor supports. Check and see they are all the same size. Next, bend the part that cements to the root of the rotor blades to the angle shown on the plan. Again check to see you have bent the same angle into all three supports.

Cement one rotor blade support wire to each arm of the rotor head. Using $\frac{1}{2}$ inch wide thin tape or silk, fasten the wire supports to the three rotor head arms. Cement well and lay aside to dry thoroughly.

Cut three rotor blades from $\frac{1}{16}$ inch medium grade sheet balsa. Sandpaper to section and attach the blades to the wire supports using tape or silk to fasten the wire securely to the blades. Check with the easi-build sketches, then lay aside to dry. Make the motor stick (pylon) as shown in the sketches. Bind the bearing block and the lower hook securely to the motor stick with thread and cement well.

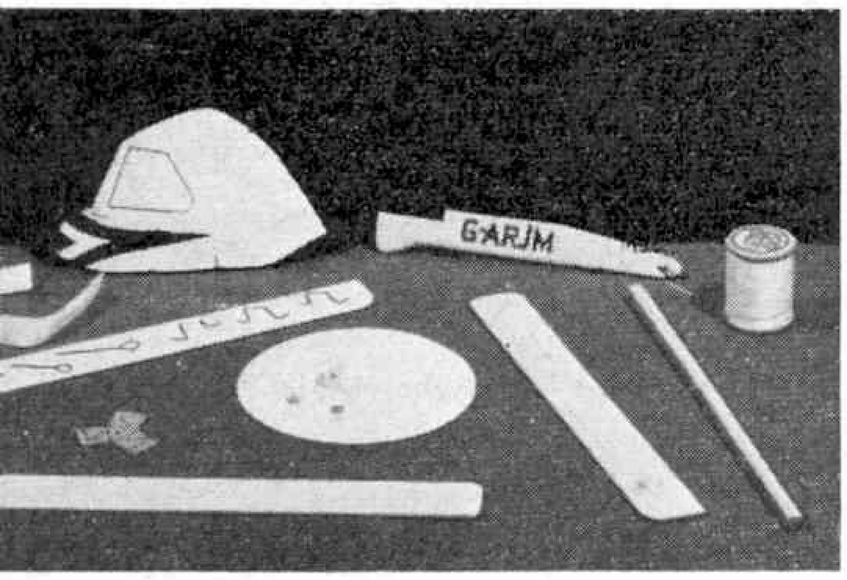
Now, before proceeding, you must balance the rotor blades. Hang the rotor up and if one of the blades hangs down, add a very small amount of Plasticine to one or both of the other blade tips. Continue to balance the blades until all three hang perfectly level. This careful balancing is most important.

Assemble the balanced rotor unit to the top of the motor stick. The drive shaft is 20 s.w.g. wire. Note the two cup washers between the rotor head and the bearing block. Bend the end of the drive shaft over and lock the rotor head with a piece of tape or silk, cement well and allow to dry thoroughly.

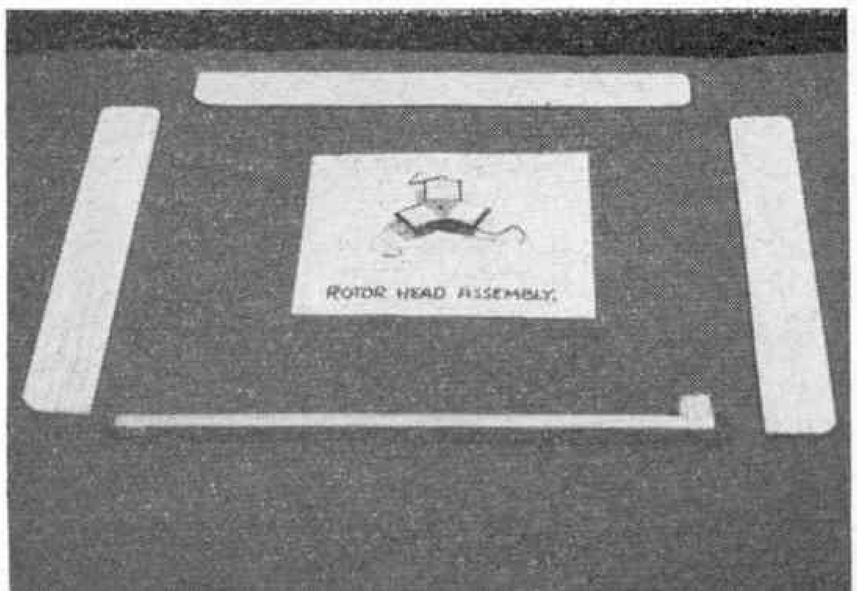
Cut fuselage and tail boom from $\frac{1}{16}$ inch medium grade sheet and join together. Add the 4 inch diameter anti-spin disc, made from thin cartridge paper, to the end of the tail boom and then cement the fuselage unit to the motor pylon.

The simple undercarriage is for display only. It fits in a slit cut in the base of

The simple parts required for the model



Accuracy is vital with the rotor head



RM 1965

Rotor blade

Cup washers

front

1/32 ply discs (2 rqd)

side

Drive shaft 20.swg

Dotted lines indicate wire parts are cemented to underneath of part

Bind with thread and cement

Section of pylon

Make from 1/4 sq hard grade balsa

Tape

Rotor blade section

Blades 1/16 sht medium grade balsa

Leading edge of rotor blade

Cement this part of wire support to underside of rotor head

Side view

IMPORTANT Note upward (positive) angle of the wire support that is attatched to the rotor blade Check that ALL THREE rotor blades are at the SAME angle

20.swg. rear hook

Bind and cement

Slit for undercarriage wire

Position of pylon (motor stick)

If model is unstable in flight bend rotor blades UP SLIGHTLY

Body 1/16 sht medium grade balsa

Slit

Rotation

Thin tape or silk

Rotor head 1/16 plywood

Piece of tape or silk to retain drive shaft to rotor head

Tape or silk

Undercarriage. Usually remove for flying. Make from 20. swg. wire. 3/4" diam wheels Cut from 1/2 sht balsa and sandpaper to shape

Drive shaft

Rear hook

bend on dotted lines

Black tissue doped on

Shows grain direction

Do not dope. Use ball point pens and colour felt markers for decorative trim

Rotor blade supports 20. swg (3 rqd)

POWER 42" of 1/8 strip rubber made into three loops 7" long Lubricate well. Maximum turns. 140 approx.

This side is cemented to rotor head – other side to rotor blade.

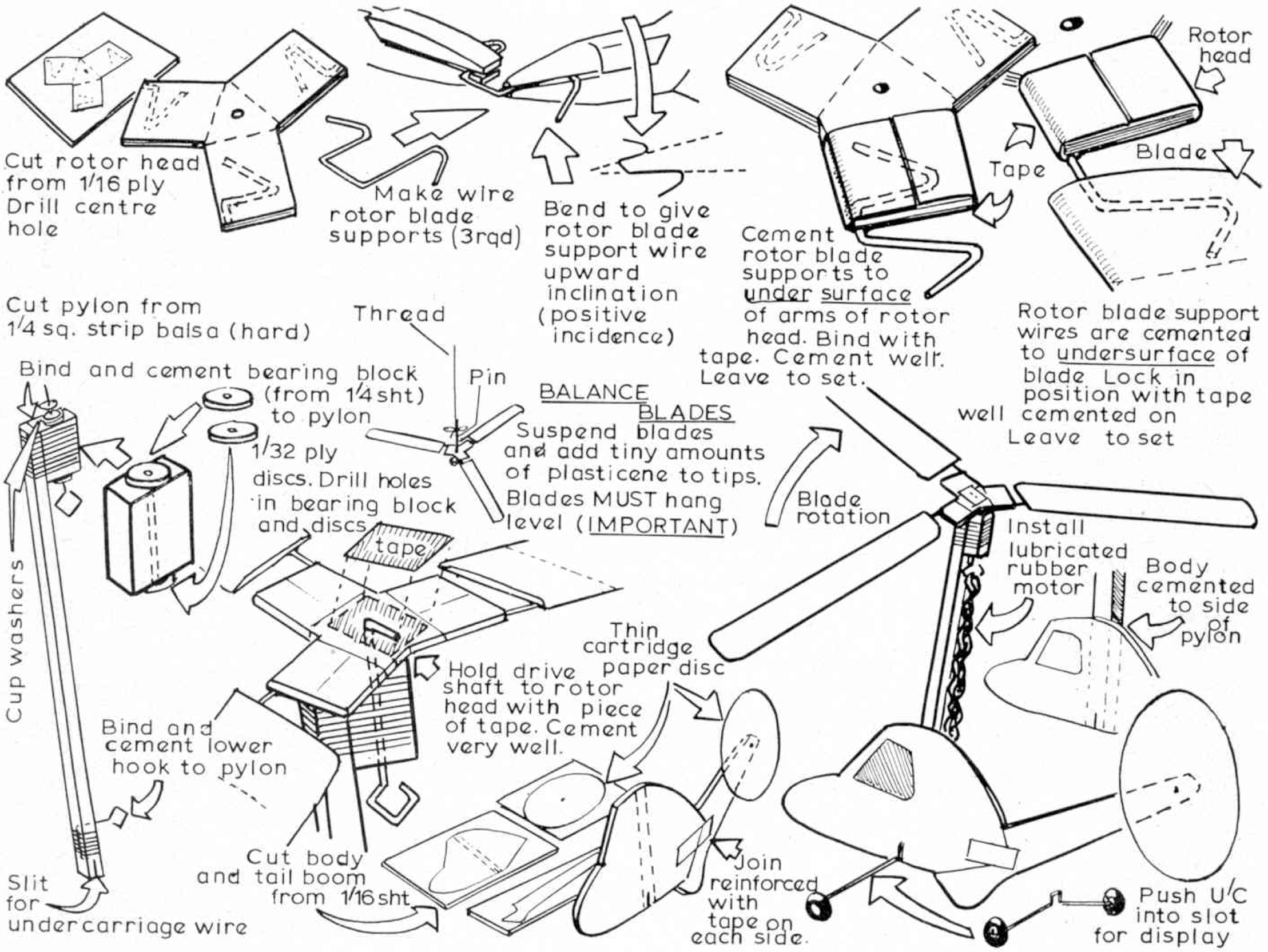
Thin tape or silk

Paper disc

N.B. The propeller can drawn on the paper disc for added realism, but the WHOLE disc must be cemented to the tail boom. Cut disc from thin cartridge paper

Tail boom 1/16 sht medium grade balsa

ASCENDA flies especially well in a high room, hall, or gym.



the motor stick and is removed for flying.

Make up the rubber motor from a 42 inch length of $\frac{1}{8}$ inch wide strip rubber. Make this into three loops, approximately 7 inches long. Rub on rubber lubricant and install the motor between the hooks on the motor stick. Your Ascenda is now ready for flying, except for any decoration in ball-point pen or coloured felt markers, you may wish to apply. Do *not* dope your model!

Flying

Your Ascenda will fly either outdoors or indoors. For outdoor testing, choose some soft grass and a calm day. There are no glide tests with a helicopter, so holding the model in one hand by the motor stick, wind the rotor blades in an anti-clockwise direction about 70 to 80 turns. Then, holding the rotor with one hand, steady the model by holding the bottom of the motor stick and fuselage with the other. Now release the rotor and gently move the model vertically upwards and letting go, try and avoid tilting it one way or the other.

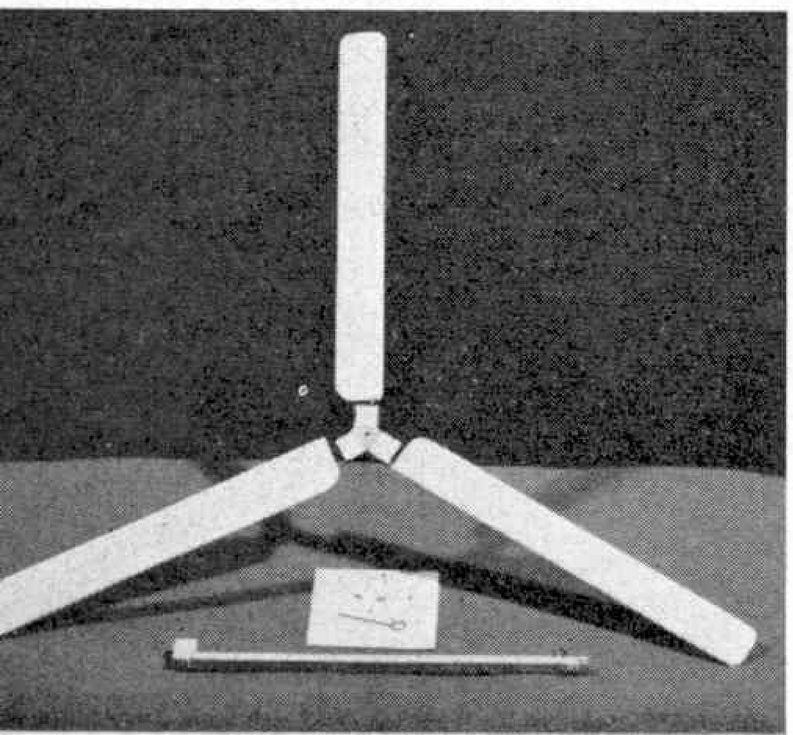
If your Ascenda topples over and falls to the ground, check the balance of the blades. This is important. If it fails to climb, but hovers at launch height, hold the rotor arms between the fingers and gently bend the root end of the blades to give a *little* more upward angle. Then try another flight.

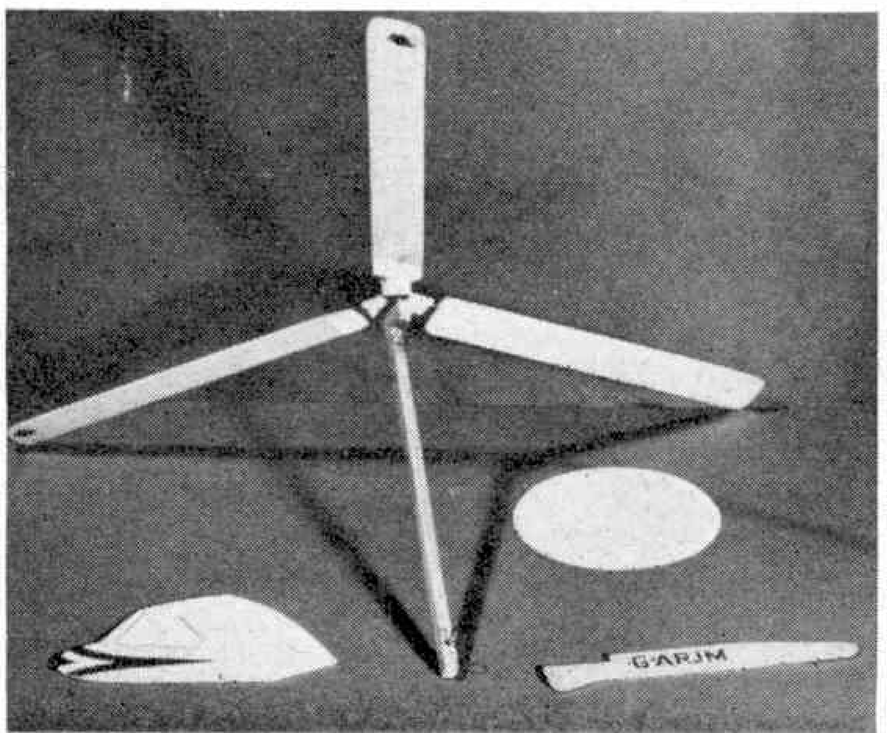
The whole secret of successful flight, assuming the rotor blades are in balance, is getting the correct upward angle of the rotor blades. You can only find the best possible angle for a really good climb by trial and error, so do not be disappointed if your Ascenda does not shoot vertically upwards on its very first flight. Finally, you can increase the turns on your rubber motor to 140.

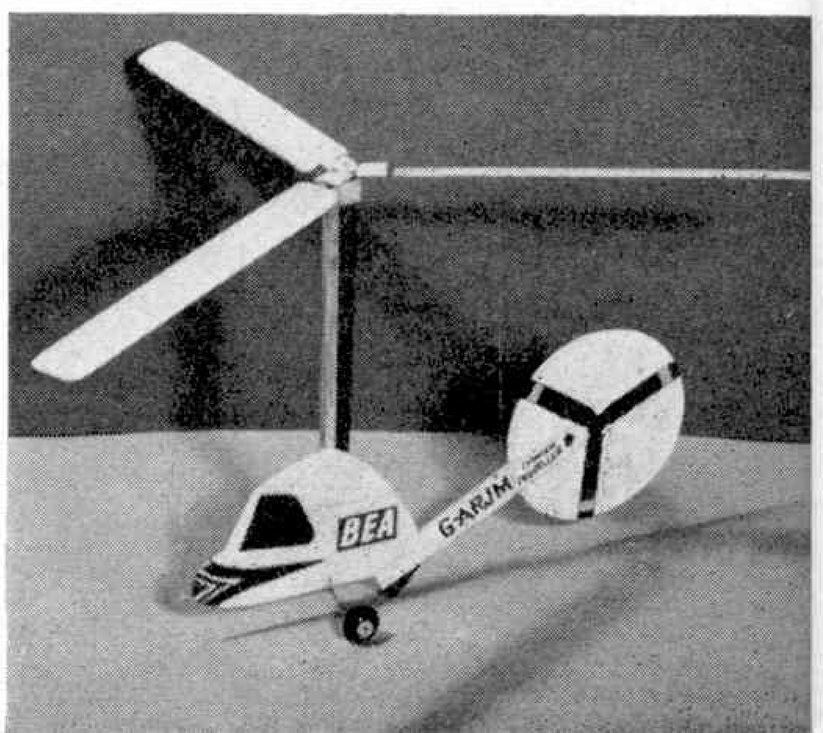
Components list

2 in. square piece of $\frac{1}{16}$ in. plywood.
1 small piece of $\frac{1}{32}$ in. plywood.
1 sheet 24 by 3 by $\frac{1}{16}$ in. balsawood (medium grade).
1 strip $\frac{1}{4}$ by $\frac{1}{4}$ by $8\frac{1}{4}$ in. balsawood (hard grade).
1 small piece $\frac{1}{4}$ in. sheet balsawood (medium grade).
12 by $\frac{1}{2}$ in. wide thin tape or silk.
18 in. length, 20 s.w.g. wire.
2 20 s.w.g. cup washers.
24 in. linen thread.
4 by 4 in. piece of thin cartridge paper.
42 in. $\frac{1}{8}$ in. strip rubber.
1 small tube of cement.
1 small tube of rubber lubricant.

Left: Rotor ready for assembly. Centre: Rotor balanced and fitted to motor stick. Right: Completed model with hand decorations







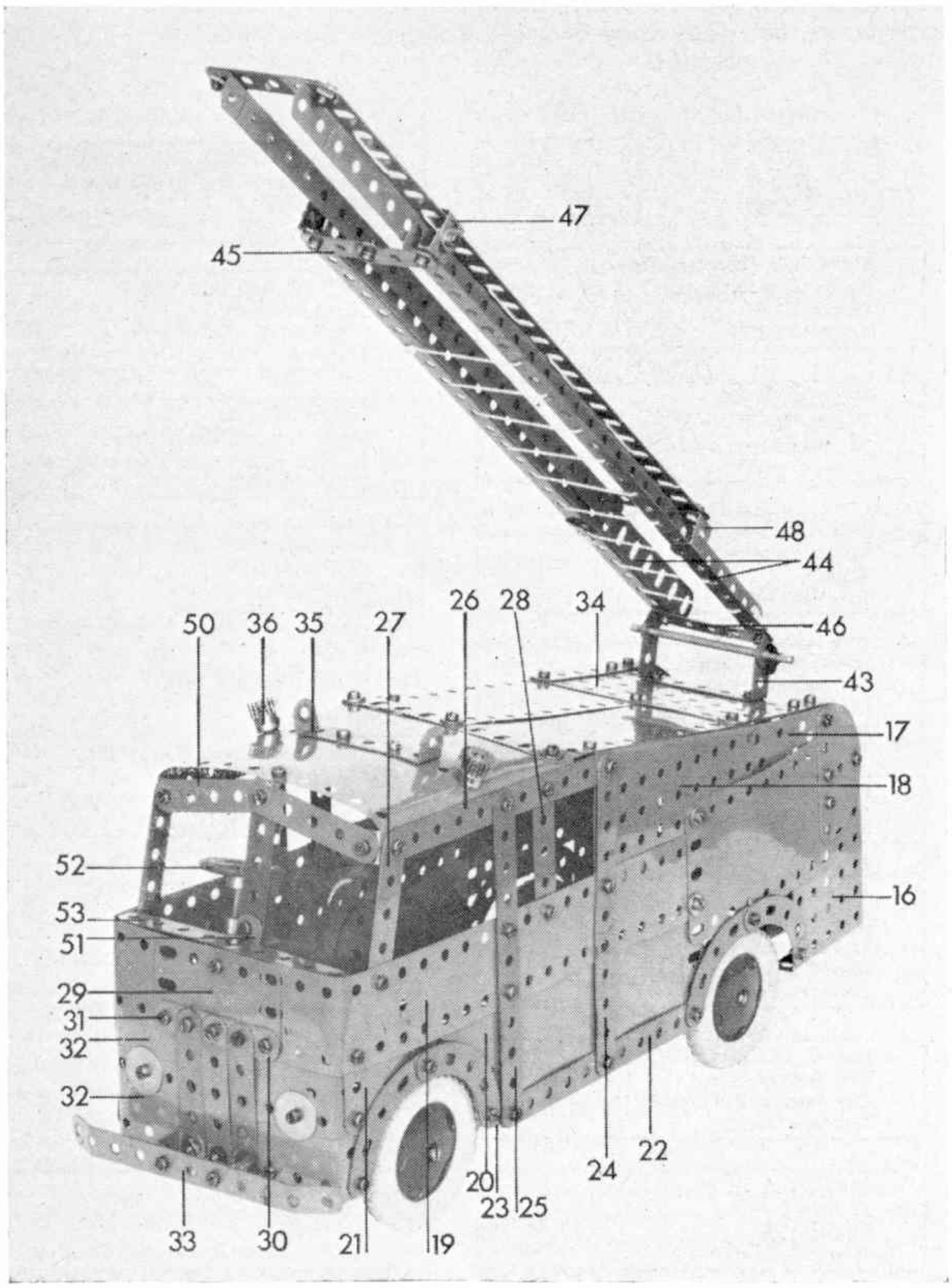
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Dinky Toy Competition 38
Meccano Competition Result 39

MECCANO
DINKY TOYS AND TRIANG-HORNBY

FIRE ENGINE IN MECCANO

by **Spanner**

Meccano Outfit No. 7 contains all the parts necessary to build this Fire Engine



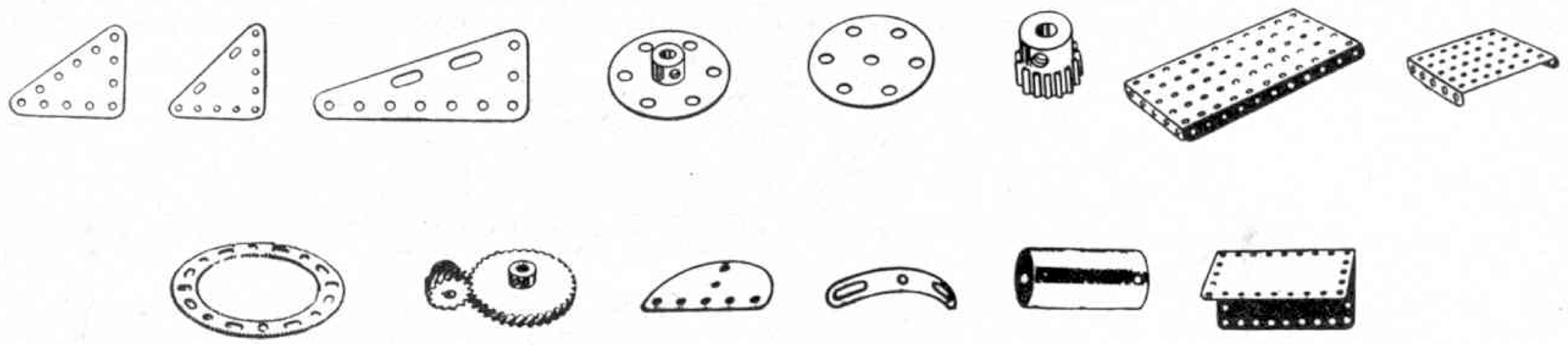
SEVERAL readers have written to me recently pointing out that we have not featured an intermediate Outfit model for some time and I have also received a number of letters asking for a model Fire Engine. Therefore, in order to please all of these readers, below I describe how to build a Fire Engine with Outfit No. 7.

A glance at the accompanying illustrations will show that the model has been based on an actual fire appliance used by many Fire Brigades throughout the country. Dinky Toys collectors will also be well acquainted with the machine, as Meccano Limited produce a Dinky Toys version under sales No. 955. Split into appropriate sections, building instructions for the Meccano-built version are as follows:

Chassis and Steering

Two 12½ in. Angle Girders 1 are connected at the front by a 3½ in. by 2½ in. Flanged Plate 2, at the same time bolting a 3½ in. Strip 3 in position. At the rear they are joined by a compound 4½ in. strip 4, made up from two 2½ in. Strips. Fixed to the top of Flanged Plate 2 by the bolts securing the Girders to the Plate are a 2½ in. by ½ in. Double Angle Strip 5 and two ½ in. by ½ in. Reversed Angle Brackets 6, one at each side. A 1½ in. Rod, carrying a Crank 7, six Washers and a Collar 8, is mounted in the free lug of each Reversed Angle Bracket and one end of Strip 3. A ⅜ in. Bolt, carrying a 2½ in. Road Wheel is then screwed into the transverse tapped bore of Collar 8. The Road Wheel must be free to turn on the shank of the Bolt.

Lock-nutted between the arms of Cranks 7 is a 3½ in. Strip 9, the left-hand bolt also holding another 3½ in. Strip 10. At its other end, Strip 10 is lock-nutted to an Obtuse Angle Bracket bolted to an eight-hole Bush Wheel 11, which is secured on a 5 in. Rod forming the steering column. Also mounted on the Rod



Dealers who specialise in Meccano spare parts

Listed below are some of the dealers who sell Meccano accessories and spare parts. This is intended to aid enthusiasts—and there are many of them—who constantly require additional spare parts for their Sets. All dealers can, of course, order Meccano spare parts for their customers, but those listed here are among our spare part specialists.

C. G. MARSHALL
Maxwell Road
BEACONSFIELD
Telephone: 1092

BATESON'S SPORTS DEPOT LTD.
58 Abingdon Street
BLACKPOOL
Telephone: 24061

TETT'S THE IRONMONGERS
402 Wimborne Road
Winton, BOURNEMOUTH
Telephone: Winton 309

H. SALANSON & CO. LTD.
83-85 Fairfax Street
BRISTOL 1
Telephone: 2-6185

BARRETT'S LTD.
2 St. George's Street
CANTERBURY
Telephone: 6161

GORDON EASTON & CO.
40 Lowther Street
CARLISLE
Telephone: 22947

R. M. HILL & SONS
36/40 Castle Street
CARLISLE
Telephone 21621 and 21122

W. PAINE & CO. LTD.
168 High Street
CHATHAM, Also at Strood and Grays
Telephone: 45215

DOLL'S HOSPITAL (YOUNGSTERS)
55 Haligate
DONCASTER
Telephone: 2831



FLETCHERS (Sports) LTD.
20-24 King Street
GLOUCESTER
Telephone: 22974

THE GUILDFORD
DOLL'S HOSPITAL LTD.
13 Swan Lane, GUILDFORD
Telephone: 61331

THE MODEL SHOP
179 Ferensway
HULL
Telephone: 29199

LUCAS'S (Hobbies) LTD.
7 Tarleton Street
LIVERPOOL 1
Telephone: Royal 7562

H. A. BLUNT & SONS LTD.
133 The Broadway, Mill Hill
LONDON N.W.7
Telephone: Mill Hill 2877

JEREMY
16 Princes Arcade, Piccadilly
LONDON, S.W.1
Telephone: Regent 1846

F. T. B. LAWSON LTD.
New George Street
City Centre, PLYMOUTH
Telephone: 65363

LANE'S TOY SHOP
75 High Street
ROCHESTER
Telephone: Chatham 41870

WILTONS SPORTS AND GAMES
Corner Canal and Queen Street
SALISBURY
Telephone: 2984

JOHN W. BAGNALL LTD.
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STAFFORD
Telephone: 3420

LESLIE BROWN
Super Toy and Model Store
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OVERSEAS DEALERS

AUSTRALIA

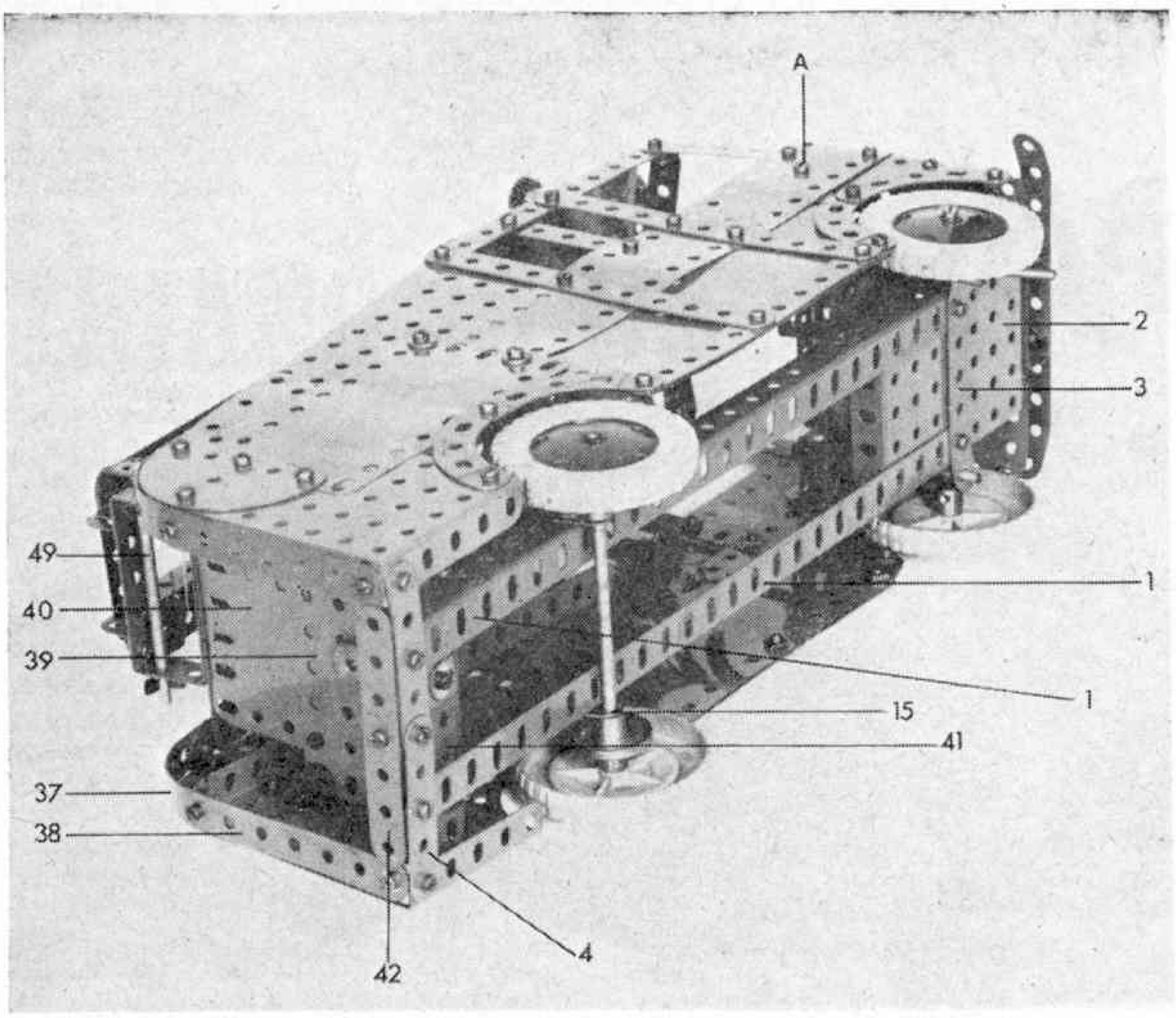
Jack Stanbridge's Hobby Shop
54a Canning Highway
Victoria Park, PERTH, W. Aust.
Telephone: 6-1668

NORTH SHORE HOBBY CENTRE
8 Post Office Street
Pymble (SYDNEY) N.S.W.

Walther & Stevenson Pty. Ltd.
395 George Street
SYDNEY
Telephone: 29. 3566

NEW ZEALAND

BUNKERS LTD.
P.O. Box 58
HASTINGS
Telephone: 84-283 (Mail orders welcomed)



An underside view of the model also showing the back of the body

are a 1 in. fixed Pulley with Rubber Ring 12, a Collar, a 2½ in. by ½ in. Double Angle Strip 13, to which a Double Bent Strip is bolted and a 1½ in. by ½ in. Double Angle Strip 14. The two Double Angle Strips will later be fixed to the body.

A Fishplate 15 is bolted to each Angle Girder 1, eight holes from the end. Journalled in these is a 4½ in. Rod, held in place by 1 in. fixed Pulleys, on which two 2½ in. Road Wheels are mounted to serve as the rear wheels.

Body Construction

Both sides of the body are similarly built from a 3½ in. by 2½ in. Flanged Plate 16, a Semi-Circular Plate, a 4½ in. by 2½ in. Flexible Plate, a 2½ in. by 1½ in. Triangular Flexible Plate 17, a Flanged Sector Plate 18, a 5½ in. by 1½ in. Plastic Plate, a 5½ in. by 2½ in. Flexible Plate, a 5½ in. by 1½ in. Flexible Plate 19, a 2½ in. by 2 in. Triangular Flexible Plate 20 and another 2½ in. by 1½ in. Triangular Flexible Plate 21. Each wheel arch is edged by two 2½ in. Stepped Curved Strips and the arches are connected by a 5½ in. Strip 22, extended by a Fishplate 23. The window and door frames are represented by three 5½ in. Strips 24, 25 and 26, a 2½ in. Strip 27 and a 2½ in. by ½ in. Double Angle Strip 28.

To enclose the front, the 5½ in. by 1½ in. Flexible Plates 19, one each side, are bent round and joined by a 2½ in. by 1½ in. Flexible Plate 29, overlapped by a 2½ in. Strip 30 along its lower edge. Bolt 31 fixing this Strip also secures Double Angle Strip 13 and Bolt A holds Double Angle Strip 14. Another two 5½ in. by 1½ in. Flexible Plates 32 are then bolted between the sides, as shown.

Two ¾ in. Washers act as headlamps, while the radiator-grille is represented by three 2½ in. Strips, bolted to Strip 30 and the lower Plate 32, at the same time fixing two Double Brackets in place. A 5½ in. Strip 33, forming the front bumper, is bolted to the free lugs of these Double Brackets. Lower Plate 32 is connected to the flange of Plate 2 by two ¾ in. Bolts, a Collar on the shank of each Bolt being used as a spacer.

Roof and Back

The roof simply consists of four 5½ in. by 2½ in. Flexible Plates and a 4½ in. by 2½ in. Flat Plate 34, fixed between the sides as shown. A 2½ in. by ½ in. Double Angle Strip 35 and two ½ in. Pinions 36 are then added, the Pinions being mounted on ½ in. Bolts.

At the rear, the side edges of Plate 34 are each overlayed by a 3 in. Strip, extended by a Formed Slotted Strip 37. This in turn, is extended by a 3½ in. Strip 38, secured to the lower flange of Plate 16 by an Angle Bracket. Fixed by Angle Brackets between Flanged Plates 16, is a 4½ in. by 2½ in. Flat Plate 39, to which two 2½ in. by 2½ in. Flexible Plates 40 are bolted. A little 'floor' 41 is provided by two 2½ in. by 1½ in. Flexible Plates, secured to Plate 39 by three Angle Brackets, then a 3½ in. Strip 42 is attached to compound strip 4, also by an Angle Bracket. A ½ in. Pulley with boss, is mounted on a ⅜ in. Bolt, passed through the centre hole of Plate 39 and, lastly, a 2½ in. by 1 in. Double Angle Strip 43 is bolted to Flat Plate 34.

Escape ladder

This, the final part of the model, is in two sections, one attached to the roof by a hinge arrangement and the other a sliding section that can be extended. The former is built up from two 12½ in. Angle Girders 44, joined at the top by a compound 2½ in. Strip 45, obtained from two 1½ in. Strips, and at the bottom by a 2½ in. by ½ in. Double Angle Strip 46. A compound double-bracket 47, made from two Angle Brackets, is held by the bolts fixing strip 45 to the Angle Girders. Cord threaded between the Girders represents ladder rungs.

The extending section of the ladder, too, is built up from two 12½ in. Angle Girders, connected at each end by a 2½ in. Strip, the bolts holding the lower Strip also holding two Double Brackets 48. Again, cord threaded between the Girders serves as ladder rungs. Incidentally, the knot where the upper end of the cord is tied to Girders 44 acts as a stop to prevent the extending section of the ladder being raised too far.

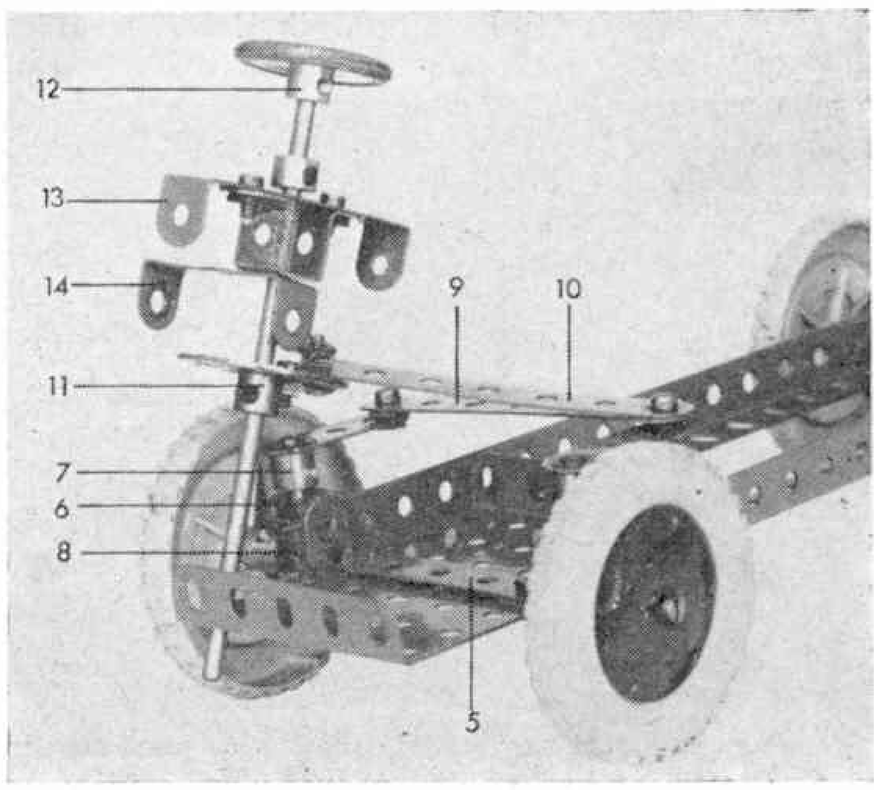
Finally, the completed ladder is attached to the body by a 3½ in. Rod 49, journalled in the lugs of Double Angle Strip 43 and 46, and held in place by Spring Clips.

All that now remains to be fitted is the windscreen which consists of two 2½ in. by 2½ in. Transparent Plastic Plates, overlayed along the top by two 2½ in. Strips 50, and connected to the sides by Angle Brackets. A ½ in. by ½ in. Reversed Angle Bracket 51 is fixed to Plate 29. Bolted to this are a 2½ in. by ½ in. Double Angle Strip 52, behind the Transparent Plates, and a compound 4½ in. strip 53, made up from two 2½ in. Strips.

Parts Required:

9 of No. 2	2 of No. 26	2 of No. 111a
6 of No. 3	2 of No. 35	5 of No. 111c
2 of No. 4	130 of No. 37a	3 of No. 125
14 of No. 5	120 of No. 37b	1 of No. 155
2 of No. 6a	25 of No. 38	4 of No. 187
6 of No. 8	2 of No. 38d	3 of No. 188
4 of No. 10	1 of No. 40	4 of No. 189
4 of No. 11	1 of No. 45	2 of No. 190
16 of No. 12	1 of No. 48	2 of No. 191
1 of No. 12c	8 of No. 48a	6 of No. 192
1 of No. 15	3 of No. 53	2 of No. 193a
1 of No. 15a	2 of No. 53a	2 of No. 194d
1 of No. 16	2 of No. 54	2 of No. 214
2 of No. 18a	5 of No. 59	2 of No. 215
3 of No. 22	2 of No. 62	4 of No. 221
1 of No. 23a	8 of No. 90a	2 of No. 222
1 of No. 24	2 of No. 111	

The complete steering arrangement



SUPER SPORTS DINKY

by Chris Jelley



The real Aston Martin DB5 Convertible. "The last word in sports cars!"

IF you were given the opportunity to choose a sports car, what car would you pick? No doubt, many of you would choose the small jobs such as the Austin Healey Sprite or the MG Midget, while others would prefer the medium-range cars such as the Sunbeam Alpine and MGB. The 'big' sports, Austin Healey 3000 and TR4, also have a large following, but I think everybody must agree that the 'king' of them all is the Aston Martin DB5.

One very special version of the DB5 has won world-wide fame by its appearance in the James Bond film 'Goldfinger'. Unfortunately this fabulous car, with its ejector seat, twin machine guns, armour plating and similar 'extras', does not really interest us here, for it is the standard production version which Meccano have just released as a marvellous, new Dinky model under Sales No. 110.

The word 'marvellous' is not an exaggeration. Features include opening bonnet, covering a detailed engine, opening doors, windows, four-wheel suspension and Prestomatic steering, plus moulded headlamps, number plates, die-cast base and full interior fittings.

'Very good,' you may remark, 'but hardly unusual for Dinky Toys these days.' True, but this replica has another feature never before seen on a Dinky model—wire wheels! These have been die-cast from Mazak and a glance at the accompanying picture will show how realistic they look.

A fine finish

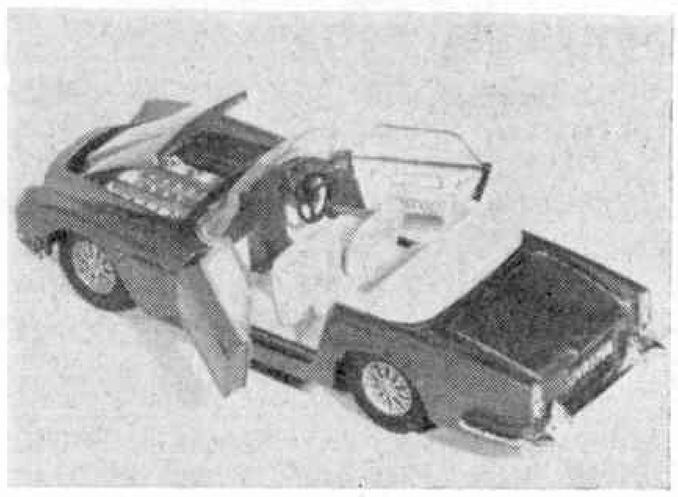
Inside the model, we have tipping backs to the front seats, panelled doors, a steering wheel and a detailed dashboard, although this last item it not shown in the illustrations. The radiator-grille is 'chromed', as also are both the front and rear bumpers. The licence number, incidentally, is INJ 483C and not UVR 576B, as shown. Finish is in a striking flamboyant red gloss, with cream interior and black base.

Moving on to the actual car, this is manufactured by Aston Martin Lagonda Ltd., of Newport Pagnell, Buckinghamshire. Power is supplied by a six-cylinder engine of 3,995 c.c. capacity that develops 282 b.h.p. at 5,500 r.p.m. and gives a maximum speed of almost 150 m.p.h. Transmission to the rear wheels is via a five-speed all synchromesh gearbox in which top gear acts as an overdrive.

If you are interested in machinery, you would be fascinated by the engine compartment of the DB5. The engine, itself, takes up most of the room, but all other available space is taken up by some sort of apparatus—three S.U. carburetters, specially-designed air filter, various pipes, tubes, reservoirs, etc. . . . —really a splendid sight for the mechanically-minded!

Bodywise, the car is available in two forms, a saloon and a convertible, the latter forming the prototype for the Dinky Toys model. Although having only two doors, seating for four is provided, with the front seats being fully adjustable, reclining bucket type. Passenger comfort is increased by carpets throughout and an excellent heater.

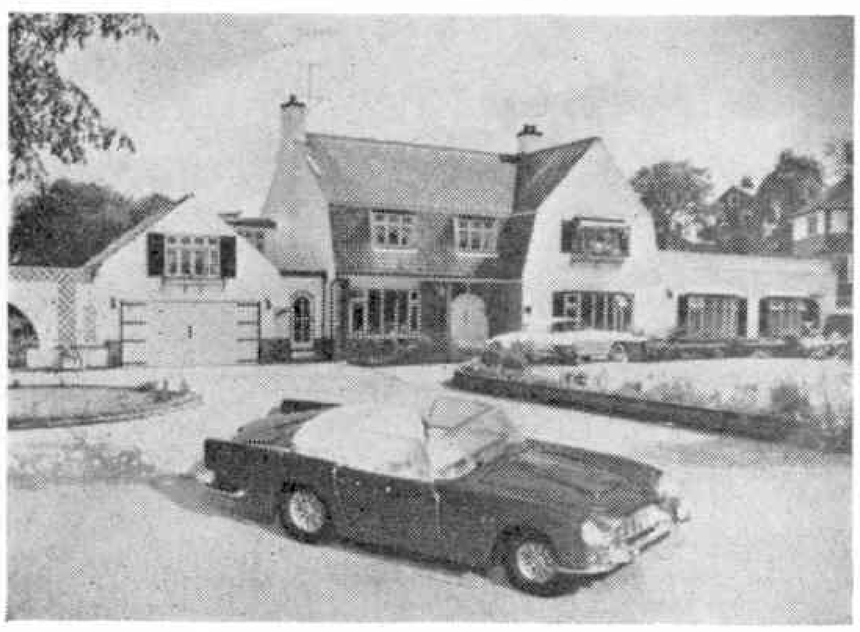
Safety features include safety glass windscreen and power-assisted disc brakes on all wheels, which are advertised as being capable of stopping the car in six seconds from 100 m.p.h. Also present is a highly-efficient, twin-pipe exhaust system, incorporating four silencers, that reduce sound inside the car to an absolute minimum.



Wire wheels are just one of the features incorporated in the Dinky DB5

Of particular interest are the petrol filler caps. Two of these are provided, one each side and they are opened from *inside* the car. I know from bitter experience that this is an enormous advantage in bad weather.

I should like to close this month by saying quite simply that I think the Aston Martin DB5 is the last word in sports cars and that the Dinky version is the best model sports car we have ever produced.



Latest release from Dinky Toys is the Aston Martin DB5, No 110, pictured here in a realistic setting

by **Linesman**

TRIANG-HORNBY

. . . a new system

THE Hornby-Dublo and Triang railways systems have for many years formed the nucleus of all commercially produced model railway equipment in this country and, it is true to say, that both systems were the most widely used among model railway enthusiasts. The integration of the two systems was the result of an examination of the equipment available and this suggested that an unnecessary amount of duplication existed between Hornby-Dublo and Triang.

Therefore, to give Hornby-Dublo owners the opportunity of using the many exciting items in the Triang range, a new system is to be introduced which will incorporate the most noteworthy features of both Hornby-Dublo and Triang. This will be called Triang-Hornby and will include special accessories enabling enthusiasts of either system to interchange their equipment.

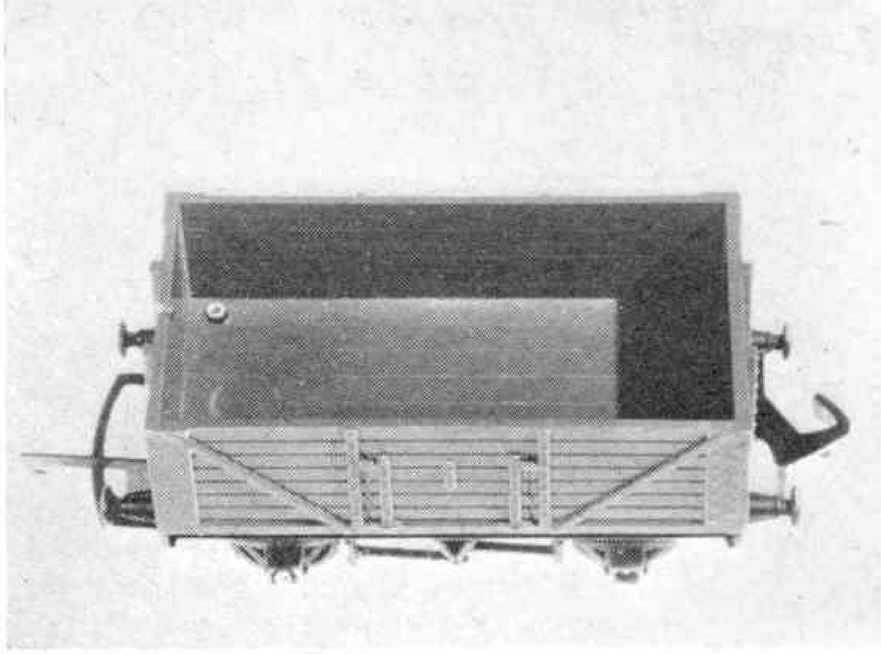
A specially published catalogue is available from your dealer describing the new system, and also the accessories that will shortly become available.

Triang-Hornby will use for its track Triang Super 4, which is both reliable and versatile. The Hornby-Dublo track that many enthusiasts will already be using cannot be directly joined on to Super 4 track, but with the addition of the Triang-Hornby converter track between the two, locomotives and rolling stock can run from existing Hornby-Dublo track on to Triang Super 4. Hornby-Dublo enthusiasts will therefore still be able to extend their existing model railways.

The Triang Super 4 track is unique in that it allows the comprehensive range of accessories illustrated in the Triang OO/HO catalogue to be clip-fitted to it. An example is the overhead catenary equipment. Also, Minic Motorways can be added to the basic model railway, something that could not hitherto be done with Hornby-Dublo track.

Hornby-Dublo locomotives and rolling stock will operate on Super 4 track and most of the more modern Triang locomotives and rolling stock will also function on Hornby-Dublo track. The Triang uncoupling rails for disconnecting the tension-lock couplings cannot be fitted to Hornby-Dublo track. However, they do not interfere with the horizontally operating coupling on Hornby-Dublo rolling stock.

A number of the items in both the Hornby-Dublo and Triang ranges will be discontinued and the Triang-Hornby system will include five of the locomotives that previously formed part of the Hornby-Dublo range. Each of these five locomotives will now be supplied complete with a Triang-Hornby Converter Wagon, which has one coupling of each type fitted to it. The Hornby-Dublo coupling cannot be used in conjunction with Triang rolling stock and although many enthusiasts may prefer to change the couplings to the Triang type, which will be standard in the Triang-Hornby range, many will find the Converter Wagon more convenient. It is simply added between the items of Hornby-Dublo and Triang rolling stock, so that a train consisting of rolling stock from both ranges of equipment, can be run on either track system. The Converter Wagon will be supplied free of charge with each of the five Hornby-Dublo locomotives in Triang-Hornby.



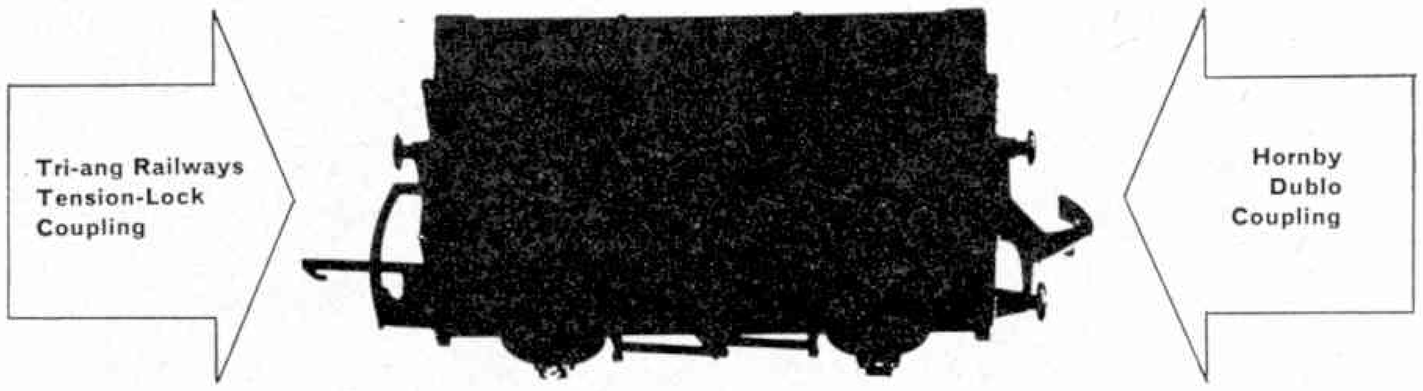
The Triang-Hornby converter wagon is used to couple goods wagons of both Triang and Hornby Dublo manufacture. This saves modifying all the couplings to one design to make up a train

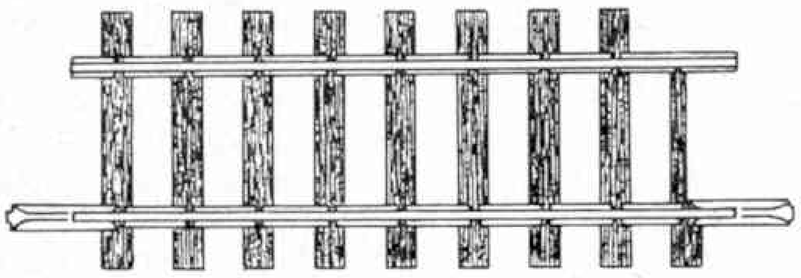
These locomotives, which have long been noted for their rugged construction and fine 12 volt D.C. motors, are the 'West Country' 4-6-2 locomotive, a favourite with all Southern enthusiasts, the 0-6-0 tank locomotive for both local passenger and shunting work, a model of the South Eastern and Chatham Railway R1 locomotive, the 0-6-2T for suburban passenger work, the Co-BO diesel-electric locomotive for fast freight trains, and finally, the 0-6-0 diesel-electric-shunting locomotive.

Other items from the Hornby-Dublo range, which will be included into Triang-Hornby, are the Terminus and Through Station Composite kit, the Terminus Canopy Extension kit, the Engine Shed kit, the Footbridge, Girder Bridge, Goods Depot with Working Crane, Double Track Tunnel, Platform Fence, Side Platform extension and Island Platform kit. All these items blend in with the remainder of Triang-Hornby accessories and the two can be used to create most effective scenes.

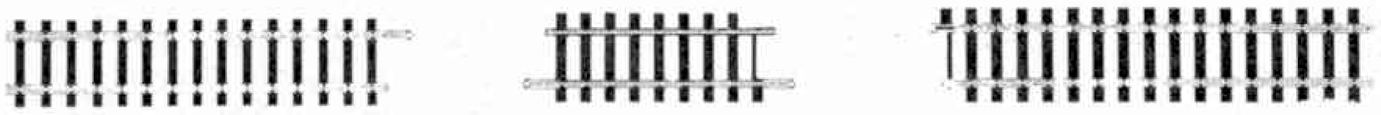
Those enthusiasts already possessing a Hornby-Dublo layout can still buy the majority of the items in the Hornby-Dublo range, although these will be available only as long as stocks last. The Hornby-Dublo rolling stock, in particular, will add that extra touch of authenticity to the layout and it is well worth while making equiries with your local dealer. The service facilities offered by Meccano Ltd. will be continued for Hornby-Dublo models and items from the Triang-Hornby range requiring attention should be sent to Rovex Scale Models Ltd., Westwood, Margate, Kent.

R.577 Tri-ang Hornby Converter Wagon. U.K. Retail Price *2/6*.





R.476 Tri-ang Hornby Converter Track. $2\frac{7}{8}$" (7.2 cms.) long. U.K. Retail Price *1/-*.



How a Converter Track connects Tri-ang Railways Super 4 with Hornby Dublo Track.

by **Spanner**

MODEL-BUILDING scope is enormously increased by the Gear Wheels and Pinions that are included in the Meccano system. Not only do these parts help animate the more usual constructions, but they also allow an entirely new range of useful working models to be built. Models falling into this range include these two easily-made examples of a weighing machine and a map measurer.

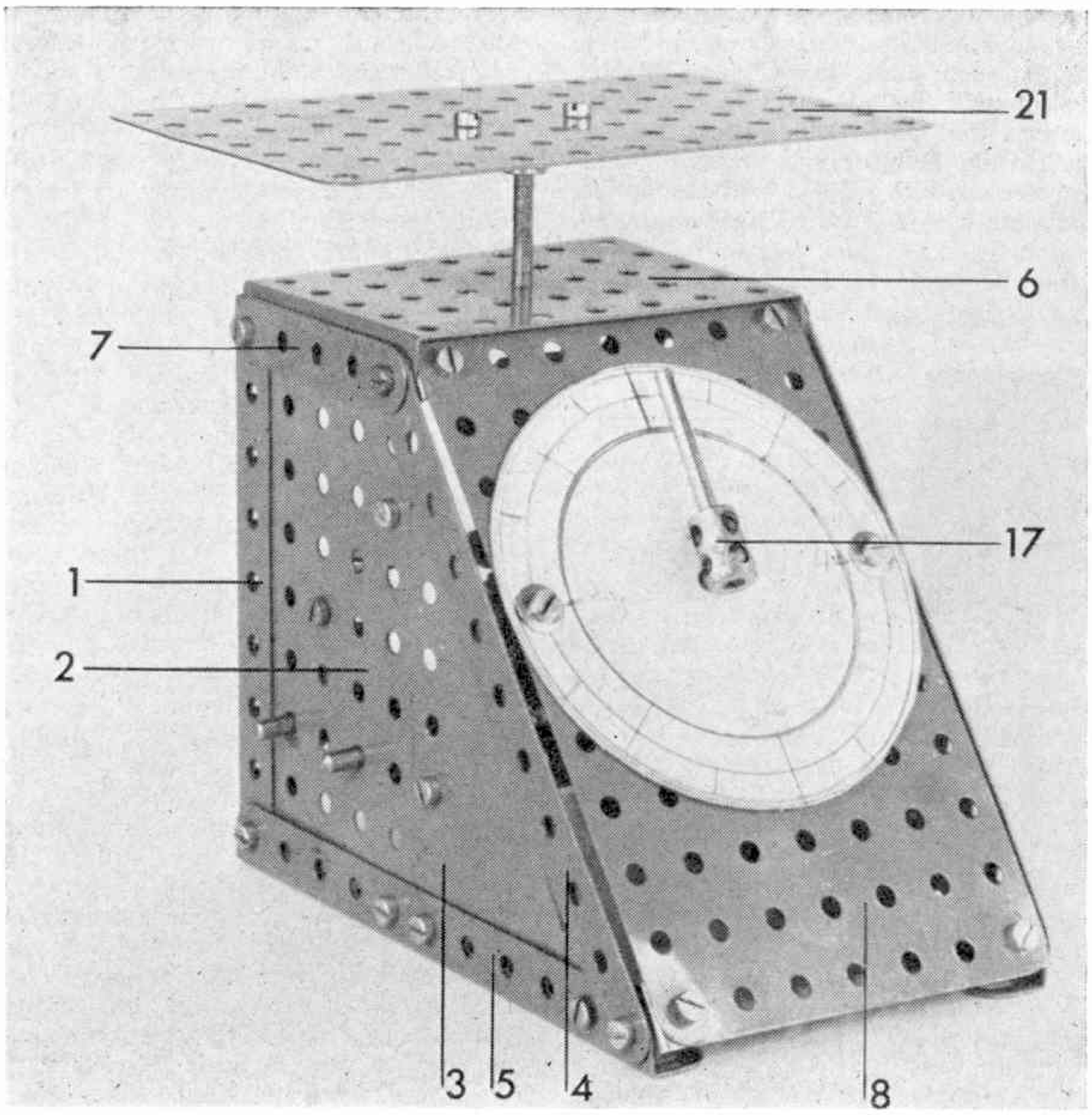
The Weighing Machine

To begin with, I shall describe the construction of the Weighing Machine, both sides of which are similarly built. A 4½ in. Angle Girder 1, a 4½ in. by 2½ in. Flat Plate 2, a 3½ in. by 2½ in. Triangular Flexible Plate 3 and a 5½ in. Strip 4 are all bolted to a 5½ in. Angle Girder 5. The two sides are then joined together at the top by a 3½ in. by 2½ in. Flanged Plate 6, at the same time fixing a 2½ in. Strip 7 in position.

A 5½ in. by 3½ in. Flat Plate 8, attached to the sides by an Angle Bracket at each corner, completes the front of the model. At the back, two 3½ in. Strips 9, one at the top and one at the bottom, connect Angle Girders 1. In the second illustration on page 37, the lower Strip 9 has been removed to help in showing the layout of the gears. Two 3½ in. by ½ in. Double Angle Strips 10 and 11 are bolted between the sides but are spaced from them by a Washer on the shank of each bolt.



The weighing machine is graduated by placing various weights on it and marking the disc accordingly



Fixed on a 4 in. Rod, journalled in Plates 2, are a ½ in. Pinion 12 and a 50-teeth Gear 13. Gear 13 is in constant mesh with a ¾ in. Pinion 14 mounted, together with a ⅞ in. Bevel Gear 15, on another 4 in. Rod. A 2½ in. Rod, carrying a second ⅜ in. Bevel Gear 16, is journalled in Plate 8 and a Fishplate bolted to Double Angle Strip 11, a Collar between the Bevel Gear and the Fishplate holding it in position. Bevel Gears 15 and 16 engage with each other.

Fitting the dial

A graduated piece of cardboard, circular in shape, is fixed to the outside of Plate 8, in such a position as to allow the 2½ in. Rod to protrude through a hole in its centre. A Short Coupling 17, carrying a 1½ in. Rod, is then secured on the end of the Rod to act as a pointer.

Two Worms 18 and a Coupling 19 are mounted on a 5 in. Rod journalled in Flanged Plate 6, and the centre hole of Double Angle Strip 10. The Rod passes through one end transverse bore of the Coupling. Held in the other end transverse bore of the Coupling is a 2 in. Rod which passes through the third hole of Double Angle Strip 10. A Tension Spring 20 is fixed to the boss of the upper Worm by a ⅜ in. Bolt and its other end is bolted to Strip 9.

Finally, a Double Arm Crank is bolted to a 5½ in. by 3½ in. Flat Plate 21, and the whole assembly is mounted on the 5 in. Rod to serve as the weighing platform. Note, incidentally, that Pinion 12 engages with Worms 18.

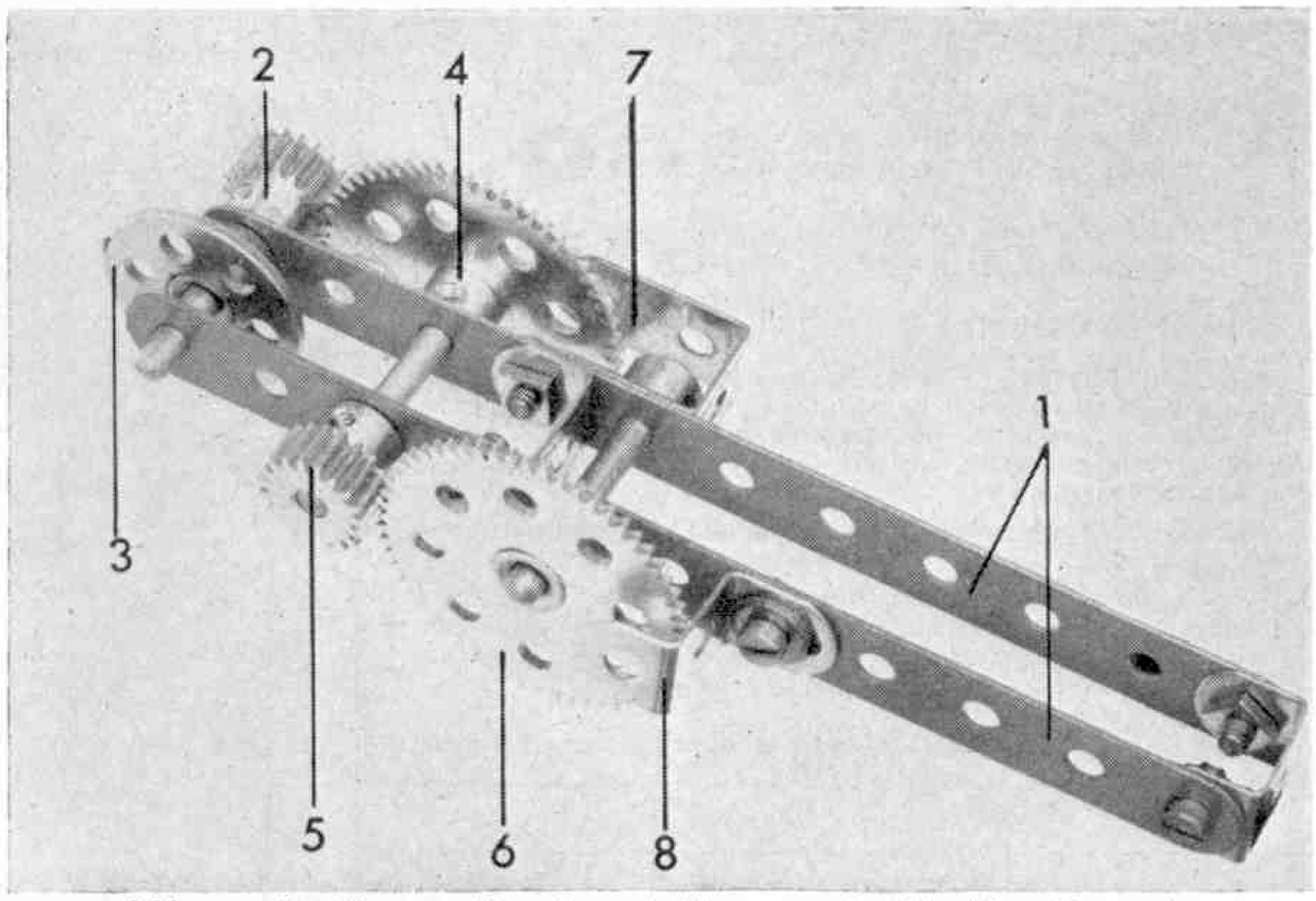
Parts Required:—

2 of No. 2
2 of No. 3
2 of No. 5
2 of No. 9
2 of No. 9a
1 of No. 10
4 of No. 12
1 of No. 15
2 of No. 15b
1 of No. 16a
1 of No. 17
1 of No. 18a
1 of No. 25
1 of No. 26
1 of No. 27
2 of No. 30
2 of No. 32
3 of No. 37a
3 of No. 37b
8 of No. 38
1 of No. 43
2 of No. 48b
2 of No. 52a
1 of No. 53
2 of No. 53a
5 of No. 59
1 of No. 62b
1 of No. 63
1 of No. 63d
1 of No. 111c
2 of No. 226

Map Measurer

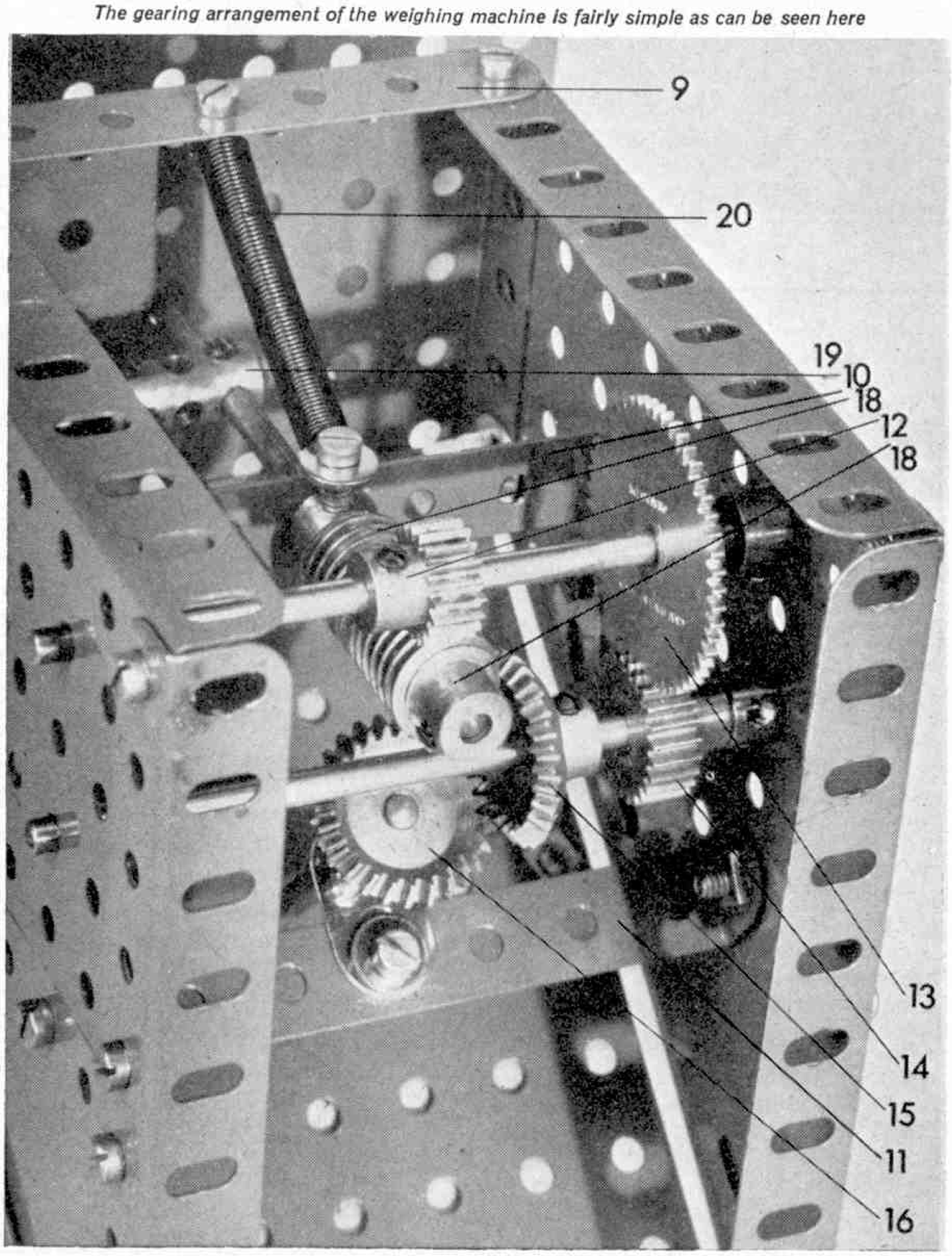
This model puts simple reduction gearing to very good use. A Map Measurer is an instrument designed for accurately measuring road distances from a map, but the beauty of the Meccano model is that it can be used with maps produced to either of two scales.

Basically, it consists of two 5½ in. Strips 1, connected by two ½ in. by ½ in. Double Brackets, as shown. Journalled in the end holes of the Strips is a 1½ in. Rod, held in place by a ½ in. Pinion 2



A Meccano Map Measurer. It can be used with maps produced to either of two scales

The gearing arrangement of the weighing machine is fairly simple as can be seen here



and a 1 in. Bush Wheel 3 (Elektrikit Part No. 518). The Pinion is in constant mesh with a 57-teeth Gear 4 on another 1½ in. Rod that carries a second ½ in. Pinion 5 at its other end. Pinion 5, in turn, is in constant mesh with a second 57-teeth Gear 6 on a third 1½ in. Rod, secured by a Collar.

A 1 in. by 1 in. Double Bracket 7 is bolted to one of the 5½ in. Strips 1 so that one of its lugs projects over Gear 4, while a ½ in. by ½ in. Reversed Angle Bracket 8 is bolted to the other 5½ in. Strip, one of its lugs covering Gear 6.

Although not shown in the illustration, cardboard discs are glued to Gears 4 and 6, and graduations are marked on these according to the scales of the maps with which the instrument is to be used. Let us assume, for example, that it is intended for both 1 inch to the mile and 4 inches to the mile maps. Zero is marked on Gear 4 then Bush Wheel 3 is rolled a distance of one inch and the figure 1 added to Gear 4. The Bush Wheel is rolled another inch and figure 2 is added etc.

For 4 inches to the mile maps, zero is marked on Gear 6. Bush Wheel 3 is rolled a distance of four inches and the figure 1 marked on Gear 6. Another four inches then figure 2 is added and so on.

Before starting to measure, make sure that zero appears in the 'window' represented by either Reversed Angle Bracket 8 or Double Bracket 7. Distances on 1 inch to the mile maps are indicated by Gear 4 while Gear 6 applies to 4 inches to the mile maps.

Parts Required

2 of No. 2
2 of No. 11
1 of No. 11a
3 of No. 18a
2 of No. 26
2 of No. 27a
5 of No. 37a
5 of No. 37b
1 of No. 59
1 of No. 125
1 of No. 518

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MECCANO MAGAZINE is the best medium for selling your old train set, stamp collection or any other item which is no longer of use to you but of possible use to others Also, if you are short of an item for your collection, why not search for it by advertising in Meccano Magazine?

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Sales/Wants/Swops (*Strike out which is not applicable*)

1	2	3
4	5	6
7	8	9
10	11	12
13	14	15
16	17	18
19	20	21
22	23	24

If you require further words please continue on another sheet of paper.

Advertisement Enquiry Service

June

A list of advertisements in this issue of MECCANO MAGAZINE is given below. If you would like further information on any of the products and services advertised, please tick in the appropriate space, fill in the coupon and return to us.

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- ☐ Battstamps
- ☐ Central Stamps
- ☐ Castrol
- ☐ Dunlop
- ☐ Derritron (REP)
- ☐ Evans Bros.
- ☐ Falcon
- ☐ Foton
- ☐ Frog
- ☐ G. B. Cycles*
- ☐ Granta
- ☐ Granville Lucas
- ☐ H.A.C.
- ☐ Stamp Club
- ☐ Hinton
- ☐ Ilford
- ☐ Johnson
- ☐ KeilKraft
- ☐ King Charles
- ☐ Kodak
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- ☐ Meccano (Dinky Toys)
- ☐ Meccano Construction Sets
- ☐ Meccano (Cliki)
- ☐ Meccano (Skates)
- ☐ Meccano (Hovercraft)
- ☐ Miniature Autoworld
- ☐ Peco
- ☐ Pritchard
- ☐ Playcraft (Corgi)
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- ☐ P.X. Supplies
- ☐ Rearden Smith
- ☐ Revell
- ☐ Romac
- ☐ Radionic
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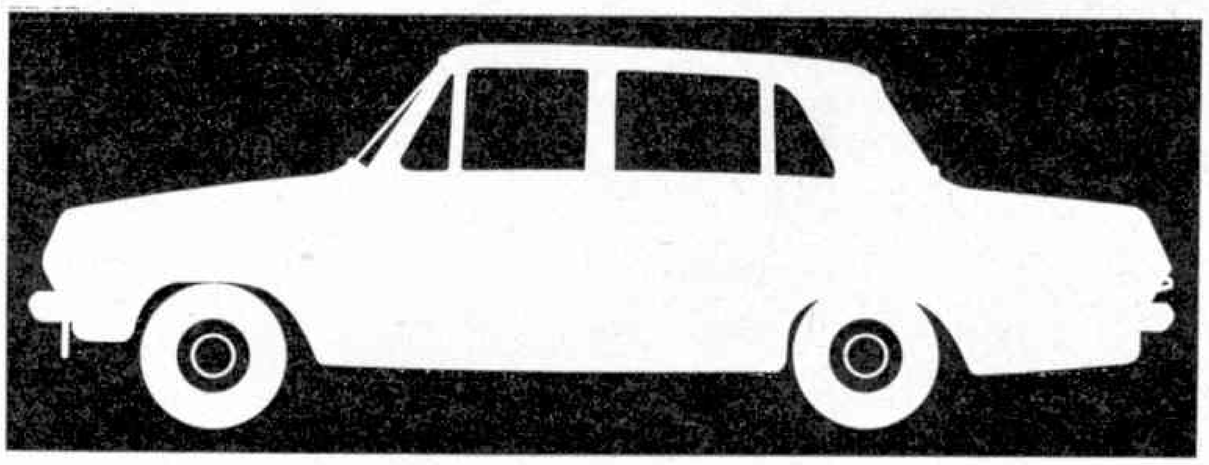
car outline COMPETITION

50 Dinky Toy Models to be won!

Fill out the form, tear out the page and send it to us. The names of the senders of the first 50 correct answers will be published in the next issue of Meccano Magazine. The winners will then be expected to write to us to claim their prize. The competition will be judged by the editor of Meccano Magazine. His decision will be final and no correspondence can be entered into.

N.B. Don't forget to make use of the Advertisement Enquiry Service and the Sales/ Wants/Swops form at the same time. All for the same postage.

To:—Meccano Magazine: Competition B, St. Alphage House, Fore Street, London, E.C.2.



The vehicle illustrated is:—

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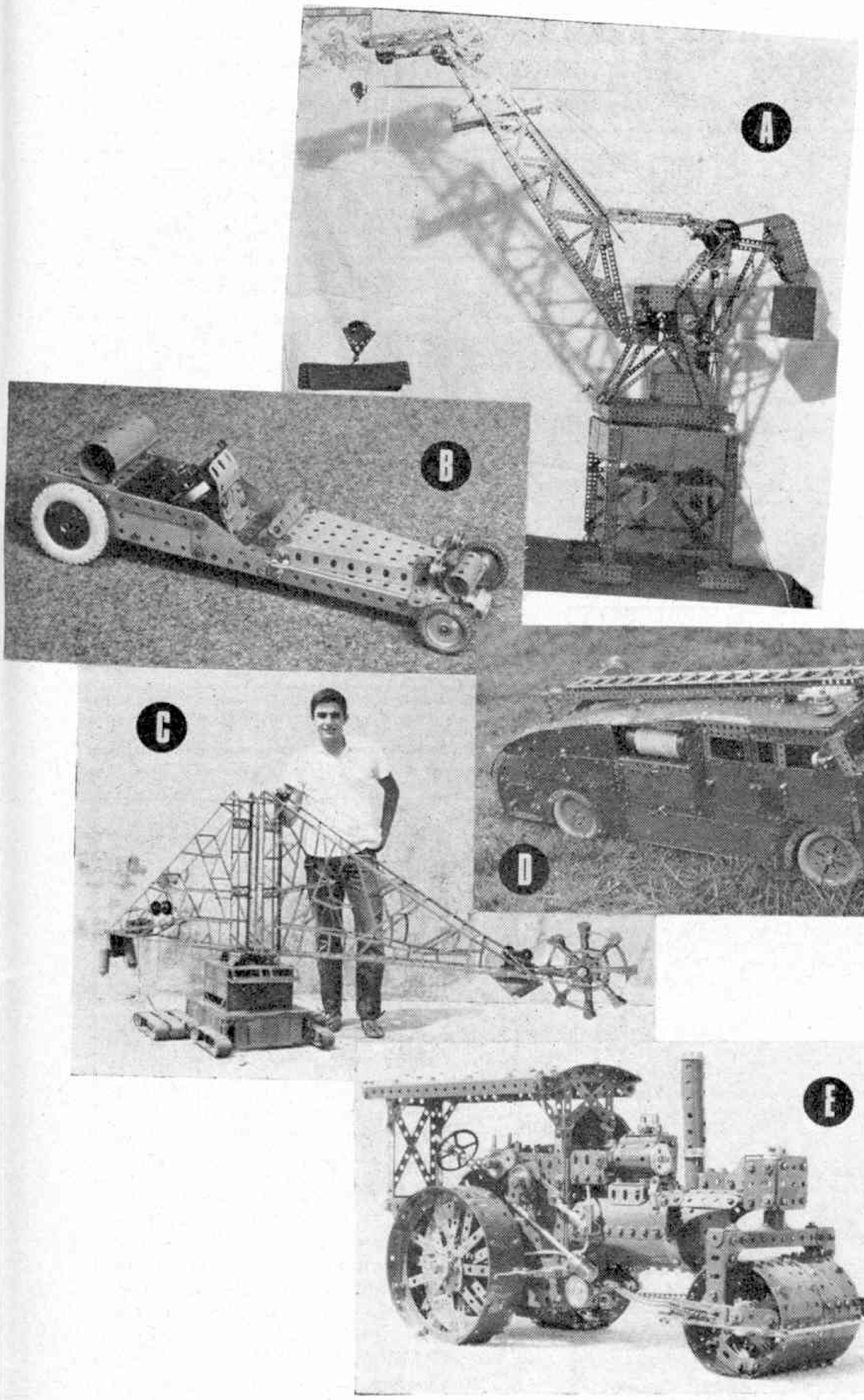
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NAME .....

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MECCANO MODEL-MAKING COMPETITION RESULTS



Winners

SECTION 'A' (Competitors under 14 years of age on 31st January, 1965). First Prize, £5.5.0: I. Clover, Combs, Stowmarket, Suffolk. Second Prize, £3.3.0: C. Wells, Withenshawe, Manchester. Third Prize, £2.2.0: J. Norris, Billacombe, Plymouth.

Ten Prizes of 10s. 6d.: P. Ward, Heage, Belper, Derby; W. Mobberley, Whyteleafe, Surrey; J. Saunders, Blackpool; B. White, Fleetwood; J. R. Cripps, Horsham, Sussex; R. W. Fidler, Tettenhall, Staffs.; S. Clarke, Penrith, N.S.W. Australia; Hatim Kaderbhai, Mombasa, Kenya; B. Niamis, Amman, Jordan; D. Salmon, Ripon, Yorks.

SECTION 'B' (Competitors aged 14 or over on 31st January, 1965). First Prize, £7.7.0: H. W. Henry, Strood, Rochester, Kent. Second Prize, £5.5.0: M. G. Waring, Kalk Bay, C.P. South Africa. Third Prize, £3.3.0: E. H. L. Roden, Cheltenham, Gloucs.

Ten Prizes of £1.1.0: N. F. Weatherley, Liverpool 4; S. M. Firth, Mirfield, Yorks.; C. M. Harrison, Horsted Keynes, Surrey; E. Barclay, London, S.W.11; P. Kraaikamp, Didsbury, Alberta, Canada; Dr. O. Lindemann, Althofstr, Germany; G. Servetti, Piacenza, Italy; G. Rodhe, Marsta, Sweden; Antonio Ertze E., Callao, Mexico 14; J. van Dijk, Vassen, Holland:

A *A scale model of an 80-ton Electric Level Luffing Crane to be seen at Durban, South Africa, won a prize in Section B for N. F. Weatherley, of Liverpool*

B *Simple, well-built models stood an equally good chance of winning a prize as was discovered by David Salmon, Ripon, Yorks, who submitted this model Dragster*

C *Antonio Ertze E. of Callao, Mexico, with his giant model of a Jaw Digger, based on a machine used by some German Companies for excavating coal mines*

D *Outright winner of Section A was Ian Clover, of Stowmarket, Suffolk, with this modern Fire Engine. Features not shown include 4-speed and reverse gear box, clutch, suspension, steering, brakes and differential*

E *This interesting and very well-proportioned Single Cylinder Road Roller netted Second Prize in Section B for Michael Waring, Kalk Bay, South Africa. An E15R Electric Motor, concealed in the fire box, provides motive power*

'THE standard of models was among the highest we have yet experienced,' said the judges, when giving their opinion of the hundreds of entries which were submitted in the last Model-building Competition. Also, the majority of models were not only extremely well-built but unusual in subject and the judges had a very difficult task in deciding the winners. A large number of entries were well within prize-winning requirements, but were unsuccessful because the large number of entries caused standards to be raised much higher than usual.

One particularly pleasing aspect of the competition was the greatly increased number of overseas entries. We have always received very good support from abroad, but this year the response was exceptional and, most important, the quality of models was excellent. This fact is proved by the high percentage of overseas winners, especially in Section B.

Before listing successful competitors, the judges would like us to mention a point which they felt should be brought to your attention for future reference. Although entrants were asked in both the November and January M.M's to write their names and addresses on the back of each photograph or drawing, several did not do so. This may not only result in the photographs being lost, but could also disqualify them from inclusion in the competition, therefore, we advise special attention in the future.

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Cont'. on page 42



by **F. E. Metcalfe**

DIAMOND DISPLAY

HOW would you like a diamond similar to the stone in the ring shown on the Belgium stamps which were issued last January to mark the diamond exhibition in Antwerp? The Belgium Post Office sends out leaflets illustrating and giving details of most of the new stamps they issue. In the leaflet referring to this "diamond" pair of stamps they illustrated uncut diamonds, resembling worthless bits of dull glass and showed how they appear when they have been cut and polished. You can see the finished article on the stamp (Fig. 1).

Varieties

The publicity which newspapers give to finds of rare stamps and the big sums they are worth, make people very conscious of the possibilities of such discoveries. For instance, I received a letter from overseas recently where the writer said that she had a stamp which had been issued in the eighteenth century and in giving an opinion on its value, would I keep in mind the huge sum which the British Guiana one cent black on magenta was said to be worth.

I have written 'said to be worth' for when it was last put up for auction in London, it didn't bring the reserve which was a mere twentieth of the supposed value of £200,000! Anyhow, I did not ask to see the eighteenth century stamp from our reader, for it would not have been a postage stamp at all, as it was not until a century later that Canada, which was the country concerned, issued any stamps.

However, it is our own stamps which seem to build up most hopes. For instance, a Newcastle, Staffs., reader wrote, 'My family have three stamps out of a stamp booklet and the top edges are unperforated. We should like to know if they are valuable and if so, how much are they worth?' The answer is, of course, nothing to a stamp collector, for in trimming off the top teeth in making up the booklet, the stamps have become damaged. For postage, they are worth their face value.

Another reader from Barrow-in-Furness wrote, 'In your September issue there is an article on booklets. I have one with watermarks sideways. Are these booklets worth anything?' The answer is, only the price paid for it at the post office, for in the case of a two shilling booklet, it is normal for the watermark to appear sideways. If, of course, it was of another value, then it might be a 'find', but there is little chance of that.

How nice it would be to tell somebody that they had made a find. It does happen, for I have made them myself, but then I handle many thousands of stamps. However, regarding booklets, while I have examined many I have never found a freak, though I have seen thousands containing stamps with cut edges! (Fig. 2).

Malawi's New Currency

Malawi, until independence the state of Nyasaland, recently introduced its new currency and what was more fitting than to tell the world about it through a set of stamps depicting the new coins. The coins were made in England, at our own Mint, but the set of four stamps were printed in Holland. The reason, no doubt, was that British printers are overwhelmed with orders for new stamps.

I was making a rough calculation the other day and discovered that Commonwealth countries, with few exceptions, are issuing three times as many new stamps as they did before the war. This, of course, is just what collectors want although it can prove expensive, but how can one resist such interesting sets as the new coinage issue for Malawi? (see Fig. 3).

Say it with Stamps

I have just finished a pleasant little job for a country which has not had its own stamps for many years. The task was to get together and mount a collection of one of every stamp which the country has issued to date. It is a country which, though still in the Commonwealth, is now free to issue as many new stamps as it wishes and, unless I am very much mistaken, it will produce in the next five years quite as many again as it has released to date. The point I want to make is that these new countries are really stamp conscious, so look out for a mass of new releases in the near future.

Tip of the Month

In my early days of collecting, nine out of every ten collectors went in for a general collection. That is, providing it was a stamp, it was added to the collection. As a matter of fact, items which were not stamps at all were often included! Then foreign countries, those outside the Empire as it was then called, started to issue so many new stamps, that collectors could not keep pace and collections had to be limited.

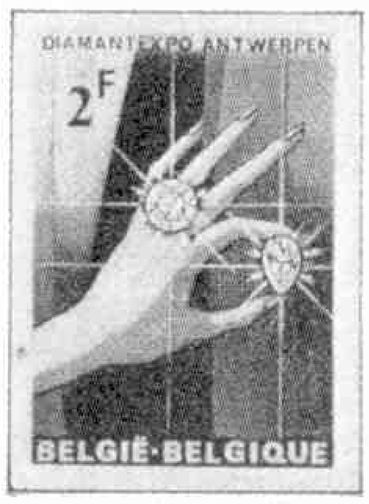
Many collectors took up Empire stamps exclusively and with the Colonial Office keeping a tight rein on such things, permission had to be obtained from them before a colony could bring out a new set, it was not very difficult for the average collector to go in for all the colonies.

However, the time has now come for further limitations, for with all these new countries in the Commonwealth, free to turn out as many stamps as they please, my advice is to stick to the countries which retain the Queen as their head. There will be too many "Republic" stamps with which to cope!

3



1



2



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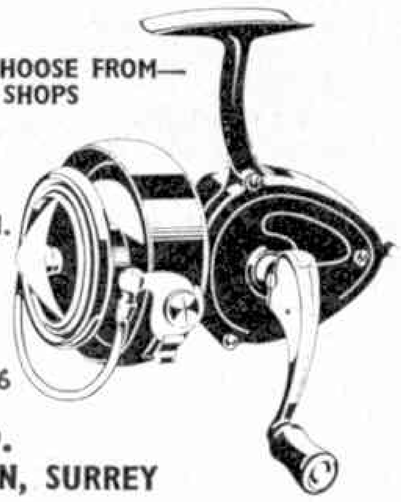
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Cont' from page 40

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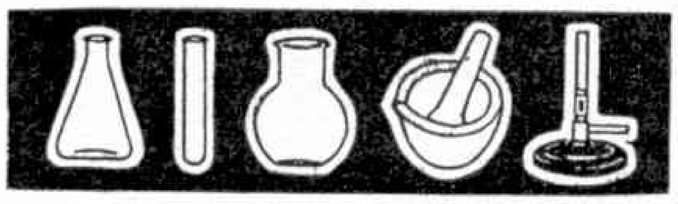
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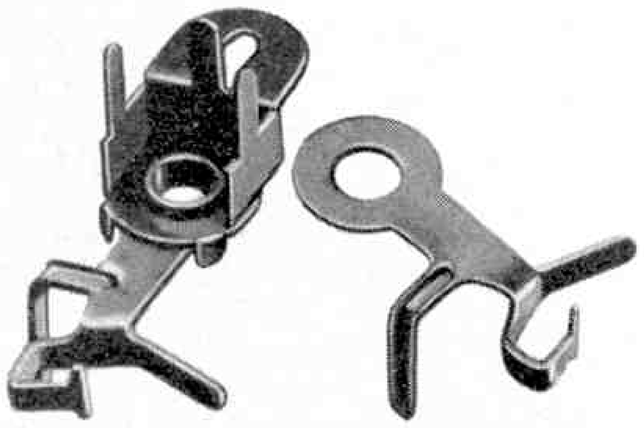
DINKY TOY WINNERS

BELOW is a list of fifty names of readers whose entries for last month's 'Silhouette' competition were the first to arrive at the Meccano Magazine's editorial offices. If your name appears in this list, then write on a postcard to: *Silhouette Prize, Meccano Magazine, Thos. Skinner & Co. Ltd., St. Alphage House, Fore Street, London, E.C.2*, and claim your FREE Dinky Toy Model Austin 1800. If your name does not appear in this list, even though you entered for the competition, do not be disappointed. On page 38 is another of our monthly competitions for you to enter and you may be lucky to see your name among the list of prizewinners next month!

Christopher Adams, Tedburn St. Mary, Nr. Exeter, Devon. **Paul Ainsworth,** Otley Road, Bramhope, Nr. Leeds. **Anthony Archer,** Upland Park Road, Oxford. **T. E. B. Baker,** Crystal Palace Pk. Road, London, S.E.26. **Graham Barker,** Park Ave., Widnes, Lancs. **Brian R. Beadle,** Harcourt Road, Thornton Heath, Surrey. **P. Benn,** Culcheth Hall Dr., Culcheth, Lancs. **G. N. Bennett,** Coombe Lane West, Kingston-on-Thames. **M. Biscoe,** Stithians-Truro, Cornwall. **R. Bradbeer,** Haling Pk. Road, South Croydon, Surrey. **A. J. Campbell,** Cardigan Close, Bletchley. **Denis R. Chick,** Marshall Lake Road, Solihull, Warwickshire. **Christopher Connell,** The Avenue, Bengeo, Hereford. **S. N. Cooper,** Kirncote, Rugby. **Graham Day,** Baldwins Lane, Croxley Green, Rickmansworth. **Peter Downs,** National Provincial Bank, Driffield, East Yorkshire. **A. Drake,** Kinnaird Way, Cambridge, Cambs. **Ian Fisher,** Chester Drive, North Harrow, Middlesex. **Derek P. Foster,** Turves Road, Cheadle Hulme, Cheshire. **P. Gribble,** Ruskin Road, Carshalton, Surrey. **Patrick Gunning,** Park Road, Rushden, Northants. **Edward Guymer,** Basnett Road, London, S.W.11. **J. Harkett,** Spearman Street, Woolwich, London, S.E.18. **T. Howlett,** Curran Ave., Wallington, Surrey. **David Hutchinson,** Rydal Road, Chester-le-Street, Co. Durham. **Michael Jackman,** Winchester Road, Andover, Hants. **K. Jackson,** Hornby Lane, Winwick, Warrington. **Christopher Jones,** Alhambra Road, Southsea, Hants. **David Kenward,** Loxford Ave., East Ham, London, E.6. **J. M. Kirk,** Brookside, Brightons, Scotland. **Simon Leese,** Pagham, Sussex. **Timothy Lord,** Clarence Close, Horsham, Surrey. **Paul Marchant,** Beeches Road, Charlton Kings, Glos. **David Marsh,** Cornflower Terrace, East Dulwich, London. **R. Morley,** Colne Road, Winchmore Hill, N.21. **J. Murdoch,** Chillingham, Alnwick, Northumberland. **Clifford Neale,** Westland Ave., Hornchurch, Essex. **Malcolm Nichols,** Northfield Road, Headington, Oxford. **G. Phillips,** Fulbrook, Burford, Oxon. **Clive Purkis,** Lucas Ave., Harrow, Middx. **J. E. Rhodes,** Nantclwyd, Ruthin, N. Wales. **R. G. Smith,** Oundle Drive, Wollaton Park, Nottingham. **Paul Steward,** Great Elmes Road, Hemel Hempstead, Herts. **J. W. Stone,** Shrewsbury Road, Bolton, Lancs. **D. J. Thomas,** Waterlog Road, Aldershot, Hants. **M. Weedon,** 60 Denziloe Avenue, Hillingdon, Middlesex. **Jonathan Wash,** Kimbolton Road, Bedford. **James Westgate,** Birkbeck Road, Hutton, Brentwood, Essex. **Gordon Wilks,** Watford Road, St. Albans, Herts. **R. G. Worsley,** Sandon Road, Hillside, Southport, Lancs.

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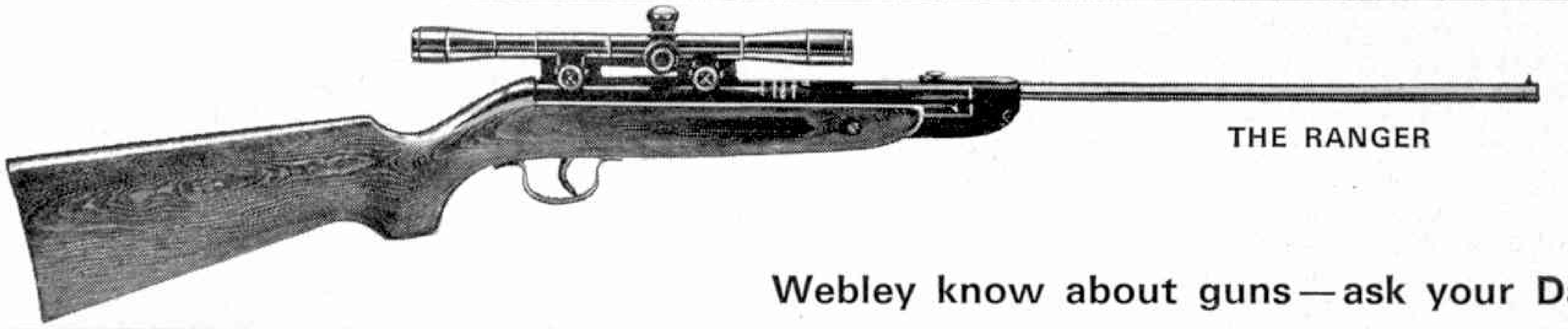


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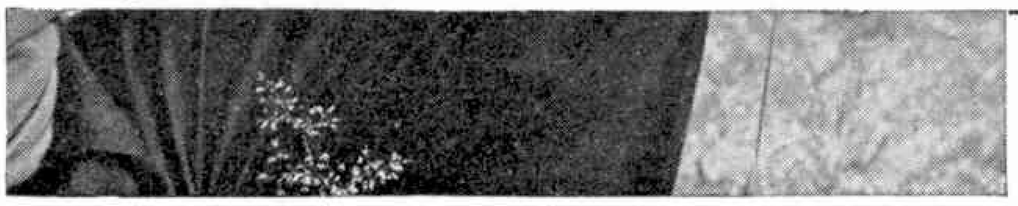
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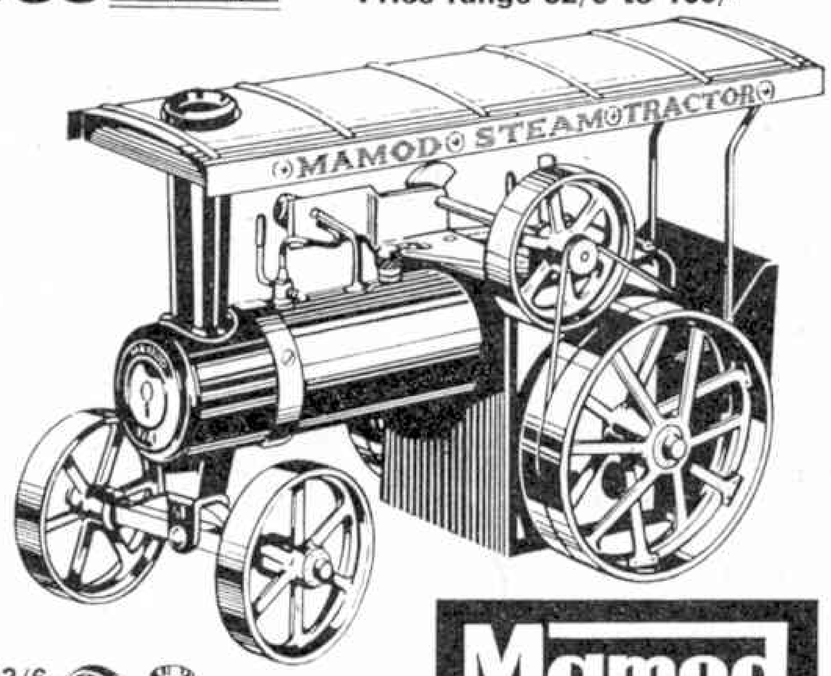
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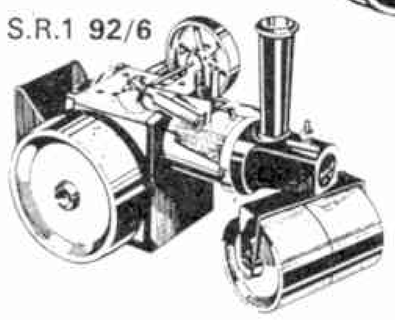
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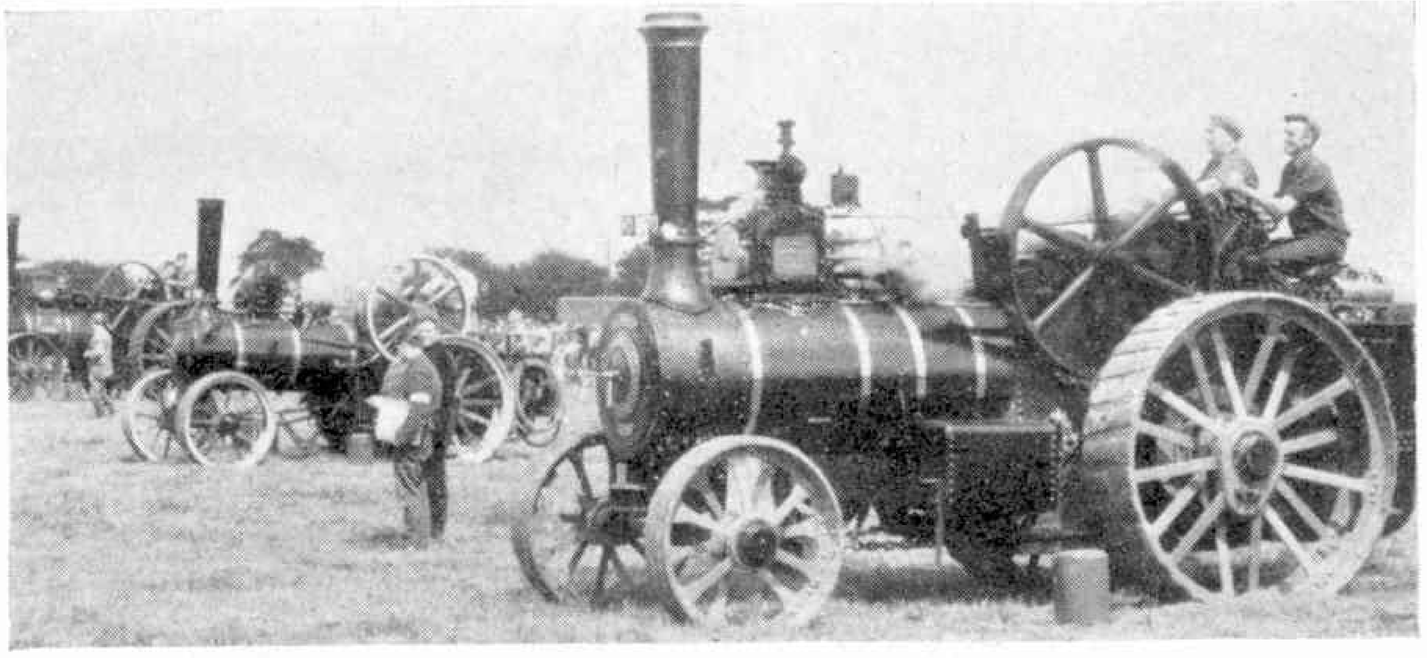
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AROUND THE SOCIETIES



The Andover and Dist. M.E.S. agricultural engine race and show which is held annually.

Twickenham and District Model Railway Club

MEETINGS are held every Friday evening at The Richmond Community Centre, Sheen Road, Richmond, Surrey, from 7.30 to 10.30 p.m. The TT layout is at present being slightly modified to improve its operating characteristics and work has recently commenced on a new 00 layout. Feature nights are held regularly, and during the next few months there will be an auction on May 21, a talk and demonstration on hand-built tracklaying on June 11, and a quiz on August 20.

A cordial welcome awaits any enthusiast living in the area and who wishes to join the club. Further information can be obtained from the Hon. Secretary, Mr. J. D. Christie, of 33 Avondale Gardens, Hounslow, Middlesex (telephone Hounslow 4646).

Andover and Dist. M.E.S.

THE ABOVE society will be holding a Traction Engine Rally at Finkley Manor Farm, Andover, on June 19, 1965. The gates will open at 12 noon and the first event will start at 2 p.m. There will be on show a large number of traction engines, and also a static display of veteran cars. Model engineering will be covered by a special display in a tent of its own. Admission to the show will be 2s. 6d. adults, 6d. children. Further details are available from the Rally Secretary, Mr. G. Howell, of 5 The Crescent, Andover, Hants.

East Ham and Dist. M.R.C.

EVER SINCE its formation in 1960, this club has frequently arranged visits to places of railway interest—partly for their own enjoyment and partly to gain a wider knowledge of the models they build. Last year they arranged a trip to Eastleigh which was very successful and, encouraged by the comments received from those who went, a visit of a similar nature has been arranged this year. A party will travel to Derby on Sunday, June 27. The visit will include Derby Works and Museum and also Crich. Transfer from Derby to Crich will be by coach. Reserved coaches will depart from St. Pancras at about 9 a.m., arriving back about 8.30 p.m. The fare, including coach transfer, and a detailed itinerary, will be 36s. (or 30s., exclusive of Crich), juniors 16 years of age 24s.

The club extends a genuine warm welcome to old friends who joined us on previous visits and also to new friends who may wish to participate on this special visit. Further details from Mr. G. R. Lloyd, Hon. Secretary, 32a Goldsmith Road, London, E.10.

Christchurch N.Z. Meccano Club.

TWO NOTABLE events in the group's diary recently was the parents' night, and the presentation of trophies and certificates on December 11, and also the Annual Meeting on February 5. The former meeting was well attended—a total of 50 members and parents being present. A game, competitions and a supper were provided by the parents, and there was also a display of models. The 'Allison Cup', an open competition, was won by Sidney Kennedy, the runner-up being Ian Grant. The 'Saunders Cup', awarded to the best junior, was won by Ian Grant, and the runner-up was Martin Steele.

Fourteen members were present at the Annual Meeting on February 5 when the President's and Treasurer's reports were read. These showed that the club finances were in good condition. The officers elected during the meeting were, President, Mr. C. E. Saunders; Vice-Presidents, Mr. R. Boundy and Mr. Gay; Club Leader, Peter Satterthwaite; Assistant Club Leader, Ian Grant; Treasurer, Mr. P. E. Saunders; Secretary, Barry Allan; committee member, T. Fox; judges, J. Curtis, P. E. Saunders, C. E. Saunders; librarian, S. Kennedy.

The Model Railway Club

THE CLUB fixtures arranged for June 1965 are as follows: June 3, Track Night (Narrow Gauge); June 10, Track Night (L.N.E.R.); June 17, 'Experiences of a Railway Slip Guard'—talk by Mr. A. Gander. Please address all enquiries to the Hon. Secretary, Mr. J. E. Geach, of Keen House, Calshot Street, London, N.1.

Merit Medallions presented to Messrs. Lloyd, Enfield, Kinchen and Dymond of Portsmouth M.C.



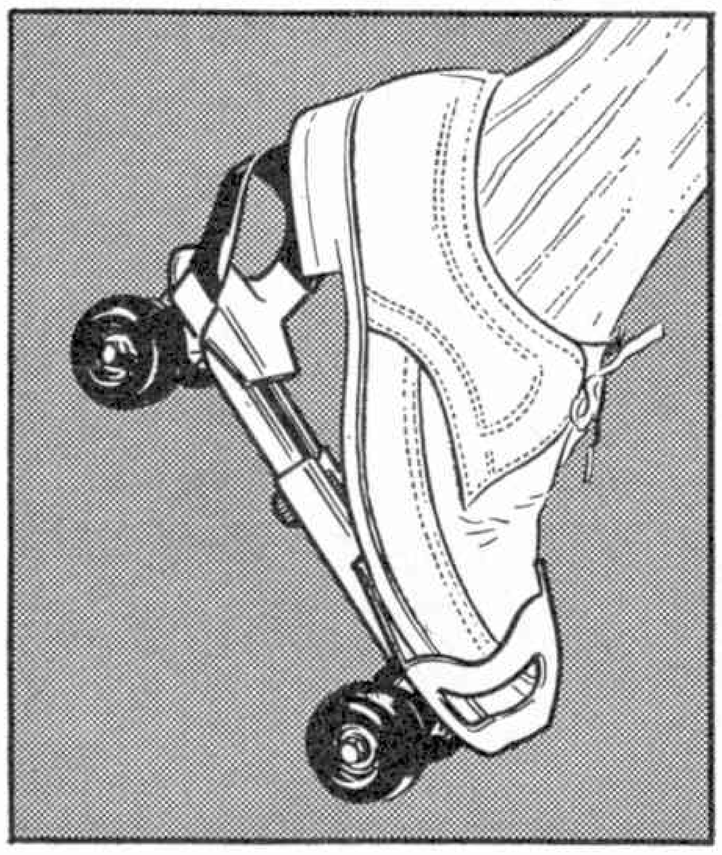


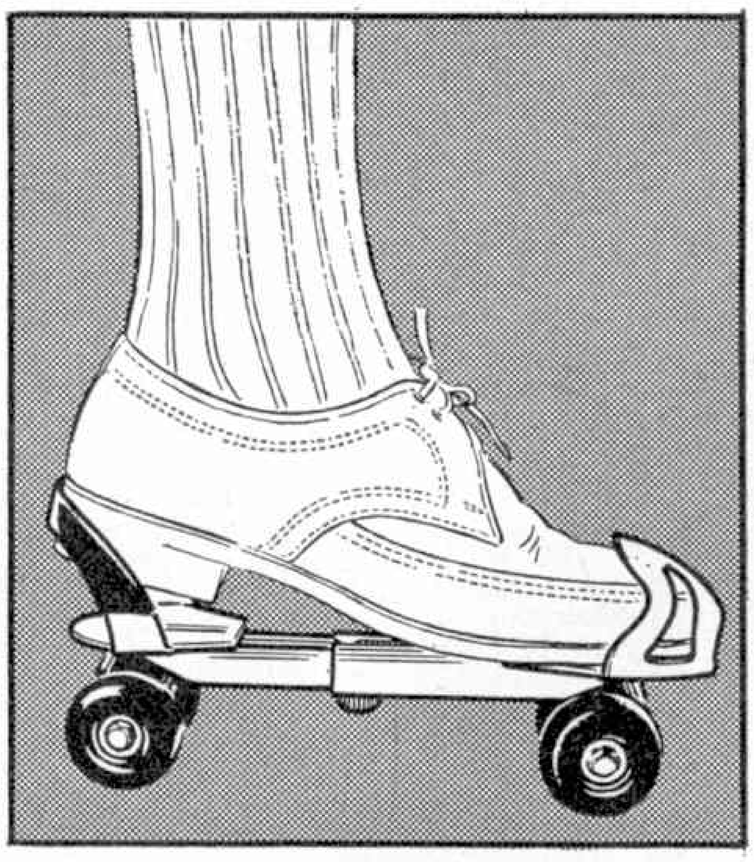
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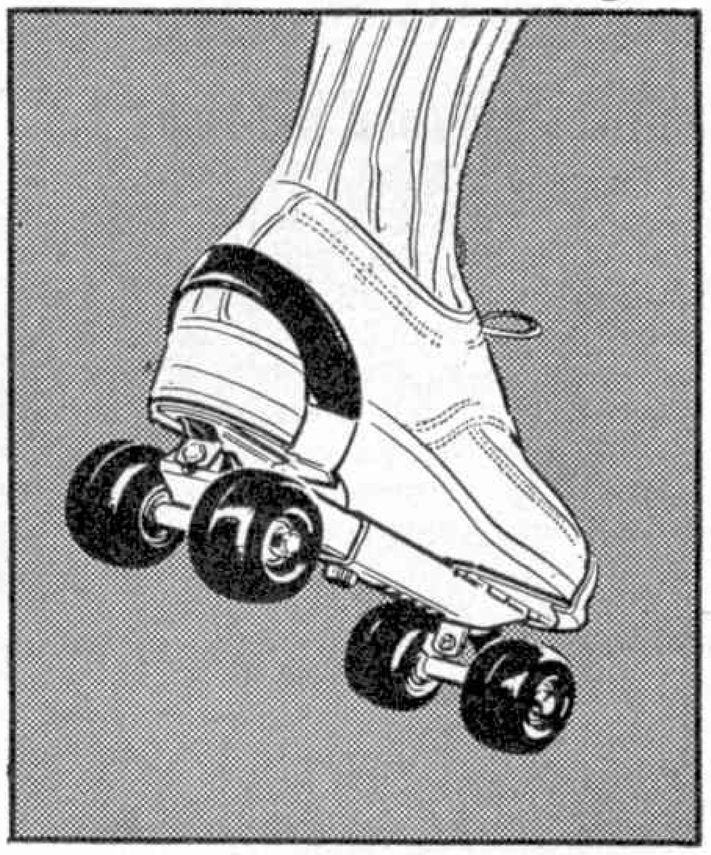
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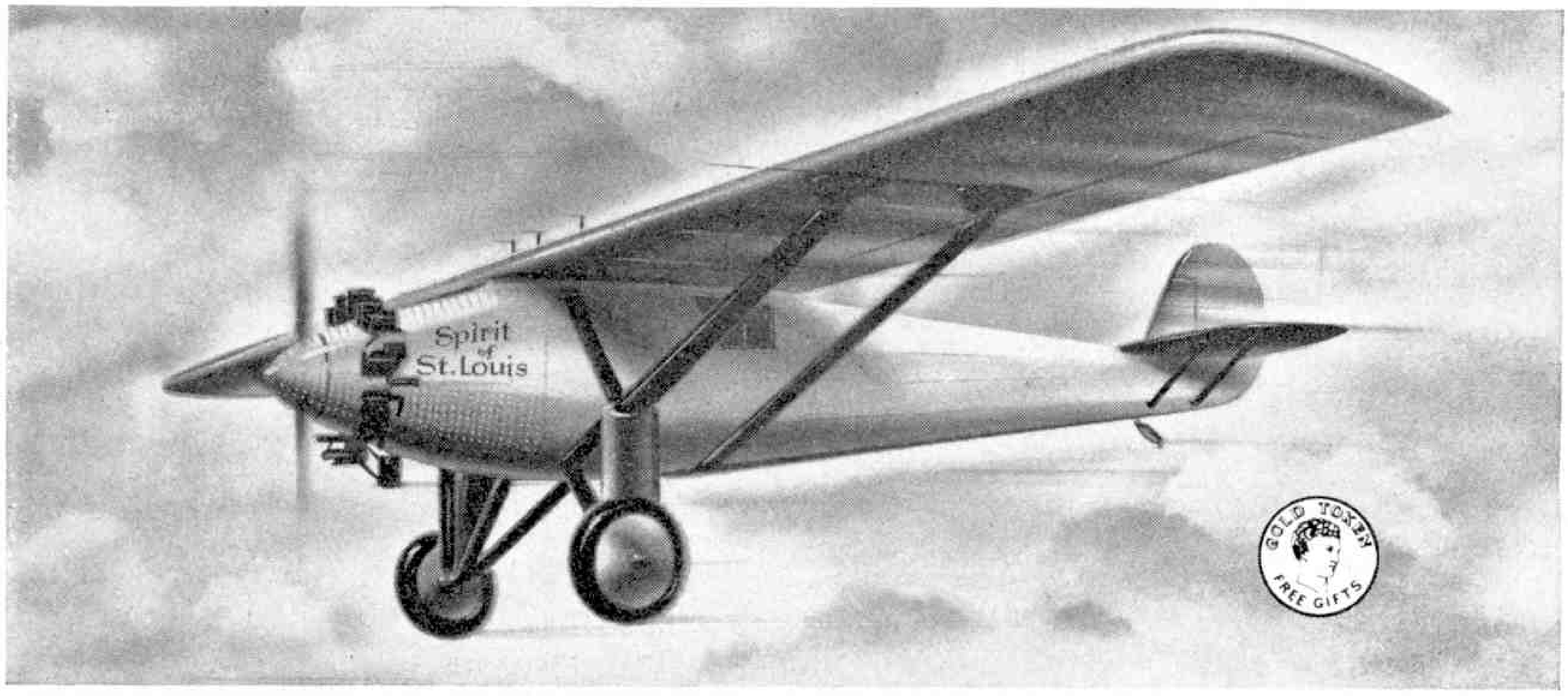
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The Spirit of St Louis was a modified RYAN M2. A super-inspected 223 b.h.p. Wright J-50 Whirlwind and a duralumin Standard Steel Co. propeller were provided. The 36-ft M-2 wing was enlarged to 46 feet, with the same Clark Y wing ribs, but for efficiency the spacing was reduced to 11 inches, leading edge wrapped with ply, and airfoil shaped balsa blocks used to fair the tips. The ailerons were reduced by 1/5 from the M-2 size to avoid wing stress, and became diminutive tabs by comparison, though quite effective for lateral control. With the larger wing and need for internal fuel tankage plus a large tank in the fuselage around the centre of gravity, the tail unit had to be shifted back 2 ft. and nose length extended 18 in. to compensate. Another major requirement was for an extra 2′ 9″ undercarriage track with bungee cord suspension on long travel legs to take the terrific load.

The fuselage was welded steel, the wings wood, with steel tube brace struts. Fuel tanks were tailored of "Ternplate". Fuselage was lined with balsam wool around the cockpit.

Wing struts were covered with balsa fairings, and all strut component joints sealed with beaten aluminium covers. Most important of all was the blending of the Ryan spinner into the square frame of the main fuselage with machine-turned polished cowlplates . . . possible only by placing the pilot aft. Also bulk fuel tankage had to be near the c.g. Lindbergh preferred being aft of the weight mass, anyway, in case of a crash, and an emergency periscope was devised.

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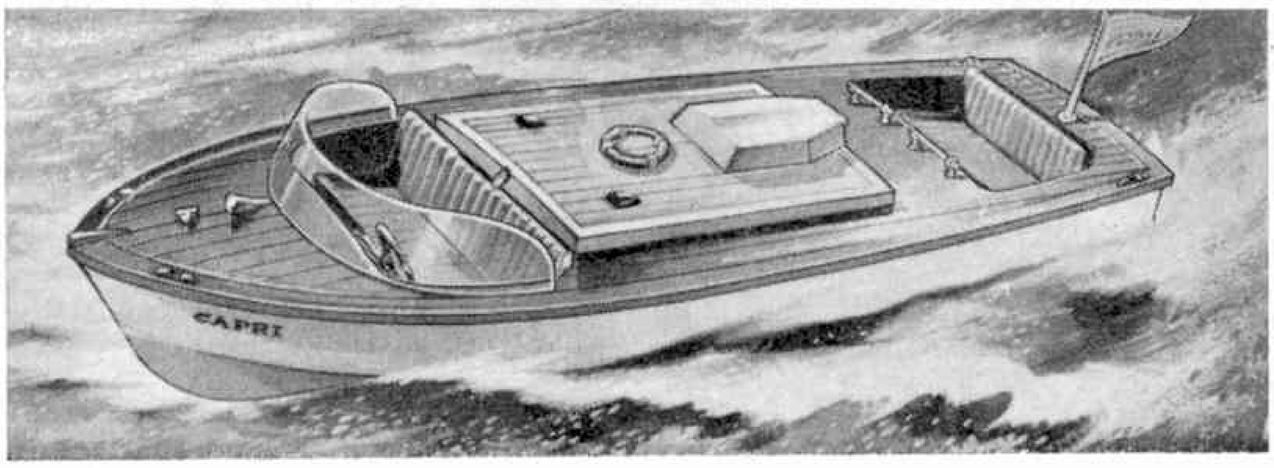
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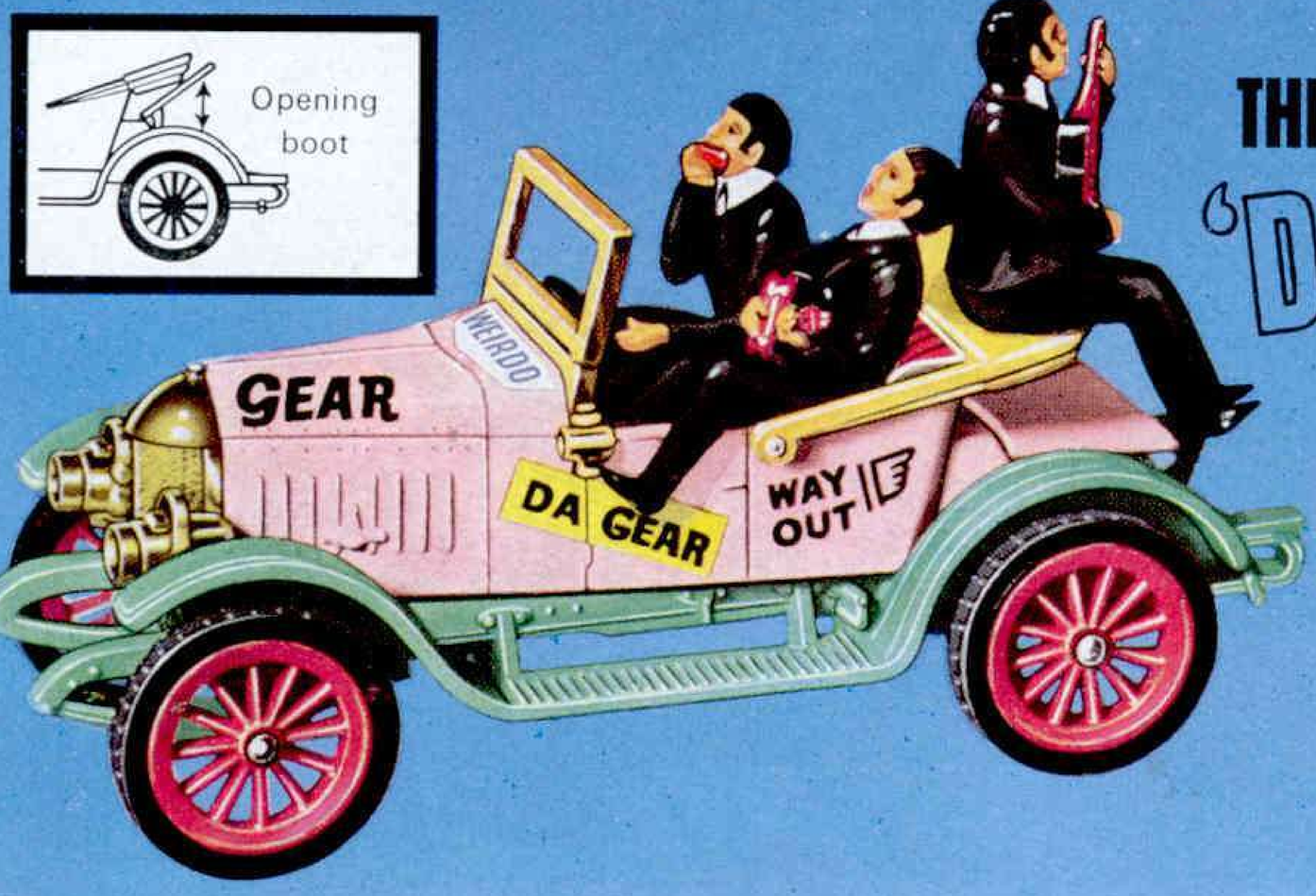
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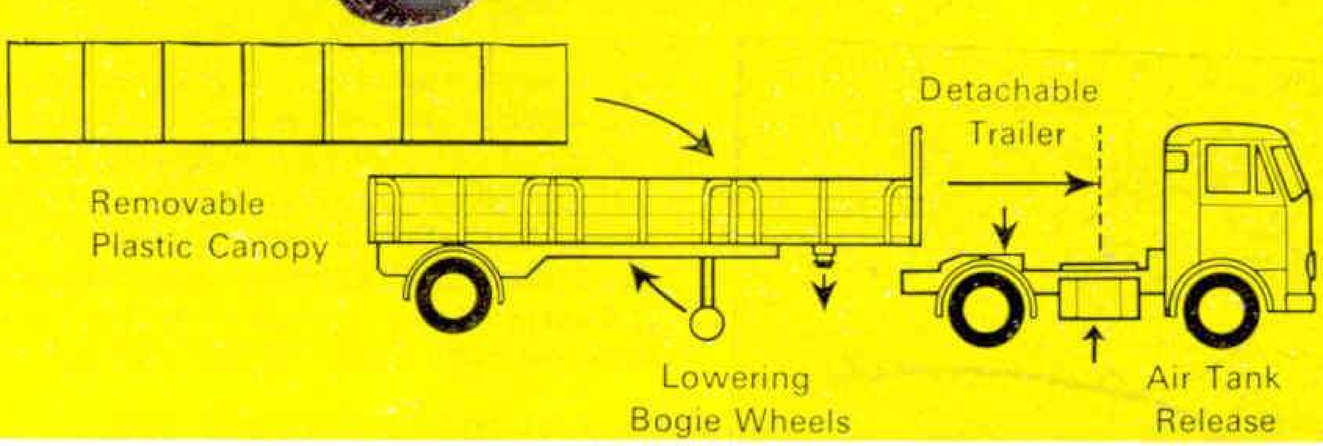
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